November, 1950

THE FOUNDRY

wherever metals are cast...

A MODERN* Truss-Type, Swivel Cupola Charger installed at Production Foundries Division, Jackson Industries, Inc., Birmingham, Ala., for Dual Cupola Service. Weigh hopper, located in crane-serviced storage yard, is 72 feet from center line of cupolas.

New MODERN* Square-Top, Small-Cone Type Side Discharge Cupola Charging Bucket.
Inclined Charger Rails are supported by Truss-Type, bridge-like structure.
Sill of Cupola Charging Door 28 feet above ground. Center line of Cupola 72' from Weigh Hopper.
Weigh Hopper, mounted in scale, in which charge is made up, is loaded by crane in storage yard.

MODERN EQUIPMENT CO.

TURN TO PAGE FACING INSIDE BACK COVER

why PURITE makes IRON Cleaner · CASTINGS Stronger

When foundry after leading foundry changes to Purite and then continues to use it, you know there must be good practical reasons for the success of this economical desulphurizer and cupola flux. There are! Just note these outstanding advantages:

1. **Purite gives 100% fluxing action in the cupola — 100% desulphurizing action in the ladle.**
2. **Purite gets to the iron quicker — no faster desulphurizer made.**
3. **Purite is time-tested and proven for unsurpassed desulphurizing uniformity.**
4. **Purite comes in 2-lb. pigs — no weighing or measuring required.**
5. **Purite is 100% fused soda ash—you do not pay for inert materials.**
6. **Purite does not crumble—no waste—no dust.**
7. **Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.**

These day-to-day benefits explain why leading foundries throughout the country regard Purite as the foremost cupola flux and ladle desulphurizing agent. Write today for specific information on how Purite can improve your iron. Mathieson Chemical Corporation, Mathieson Building, Baltimore 3, Maryland.

Purite is sold by all leading foundry supply houses in the United States and Canada.

PURITE 100% FUSED SODA ASH

The Scientific Flux for Better Melting and Cleaner Iron

Mathieson
CHEMICALS

SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

CAST IN NICKEL-CHROMIUM IRON, by the Atlantic Foundry Company of Akron, Ohio, this lead melting pot is used in a large rubber plant. It is subjected to temperatures ranging from 620° to 950° F. 24 hours per day. The pot has an inside diameter of 81", is 42" deep and weighs 7,520 lbs.

Scaling...distortion...thermal shock ...resisted by *NICKEL CAST IRON*

To assure long service life, this giant lead melting pot was produced in a cast iron containing 1.75% nickel and 0.75% chromium.

This and similar compositions have shown marked superiority to unalloyed iron in applications that call for resistance to destructive effects of moderately high temperatures.

Hundreds of progressive foundries now use nickel to secure these basic advantages:

IN THE FOUNDRY—Nickel aids the progressive foundry to meet high mechanical property specifications. It is employed in the production of engineering cast irons because it strengthens the pearlitic matrix of the iron, produces finer and more highly dispersed graphite and discourages the formation or retention of hard carbide particles.

IN THE MACHINE SHOP — Nickel cast irons provide readily machinable castings that take a smooth finish because of their improved structure and uniformity, particularly where changes in cross-section introduce difficulties and losses with unalloyed irons.

IN SERVICE—Nickel cast irons are strong and pressure-tight, thereby eliminating a frequent source of trouble in pumps, valves, pipes and fittings.

Ask us for information about the advantages nickel alloyed irons provide for specific applications. Write us today.

EMBLEM OF INCO SERVICE
TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the properties, treatment, fabrication and performance of engineering alloy steels, stainless steels, cast irons, brasses, bronzes, nickel silver, cupro-nickel and other alloys containing nickel. This information is yours for the asking. Write for "List A" of available publications.

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Editorial 87

Casting Design for Economical Molding 88
By CLARENCE T. MAREK

Determination of Zinc in Copper-Base Alloys 94
By MILTON SHERMAN

Nodular Iron Experiments 96
By E. M. STEIN

Mobilization Plan for the Malleable Industry 100

The Castings Industry and the Munitions Board 101
By COL. EARL D. PAYNE

Large Sculpture Group Cast in Aluminum 102
By JOSEPH MORRIS

Production Line Technique Used in Labor Accounting 106
By EDWIN A. HENRY

The Camera—A Useful Foundry Tool 108
By BENJAMIN MELNITSKY

Man-to-Man on the Molder's Bench 130
By RALPH L. LEE

Texans Hold Successful Conference 136
By WILLIAM G. GUDE

Steel Founders Hold Annual Fall Meeting 141
By FRANK G. STEINEBACH

Malleable Founders Meet at Cleveland 142

Nodular Iron Conference 156
By WILLIAM G. GUDE

All Canadian Foundry Conference 164
By ROBERT H. HERRMANN

A New Type of Cupola 172
By ROBERT DOAT

Improved Molding Sand 176

Conveyorized Blasting Unit 204
By VICTOR E. HILLMAN

J. I. Case Co. Modernizes Coremaking Facilities 212

The Adventures of Bill 222
By PAT DWYER

Questions and Answers 114
Men of Industry 120
Meeting Calendar 133
Around the Country 144
Industry Briefs 153
Foundry Developments 154
Obituary 158
Data Sheet 161
Activities of Foundry Groups 178
Statistics 202
New Equipment and Supplies 234
Helpful Literature 237
With the Editors 260
Trade Publications 262
Where-to-Buy Directory 280
Advertisers' Index 299

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You've probably seen one of these men many times in your own foundry; for he's your LINOIL representative.

Perhaps you buy core oil from him; maybe you don't. But whether you're a customer or not, look on your LINOIL man as a friend—a friend whose business is to help you.

The next time he calls on you, ask him about some special core problem that you have. Chances are your LINOIL man has the answer.

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(THE WERNER G. SMITH COMPANY DIV.)

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Want to Save

SHOWN INSPECTING RADIATOR PARTS BEFORE AND AFTER CLEANING, C. N. Deubner and Floyd Wells of Yates-American Machine Co. agree: "ROTOBLAST saves money!" Five old-style machines have been replaced by the one ROTOBLAST Barrel shown in the smaller photo. Cash savings each year total more than $5000—proof ROTOBLAST is economical!

MEMBER FEMA FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC.

Pangborn

* Trademark of Pangborn Corporation

$5000 per Year?

Read how manufacturers save money with Pangborn ROTOBLAST*!

Authentic cases in our files *prove* Pangborn ROTOBLAST *saves money* on blast cleaning. For example, take this performance at Yates-American Machine Co., manufacturers of high-quality heat transfer products. Since ROTOBLAST went into operation they have saved more than $5000 a year on blast cleaning!

Other Pangborn users report equally impressive annual savings of five, ten, eleven thousand dollars *and more* when ROTOBLAST takes over a blast cleaning job. Throughout industry, for companies like General Electric, General Motors, Ford ... ROTOBLAST saves time and labor, and keeps cleaning costs low *without sacrificing quality!*

WHAT ABOUT YOUR PLANT?

If you clean castings, forgings or heat-treated parts, and if you want to save time, money and manpower ... find out about ROTOBLAST. There's a standard Pangborn Table, Barrel, Room or Table-Room designed for every cleaning job. To get specifications, descriptions and full facts, write for Bulletin 214. Just address: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Maryland.

ROTOBLAST

SAVES LABOR: *One ROTOBLAST machine and operator can do as much as a two-man crew and old-fashioned equipment.*

SAVES SPACE: *In many cases, one ROTOBLAST machine replaces five or more old-fashioned machines, requires less space.*

SAVES TIME: *Cases on record prove ROTOBLAST can cut cleaning time up to 95.8% compared with old-style methods.*

SAVES POWER: *Modern ROTOBLAST uses but 15-20 h.p. compared to old-fashioned equipment requiring 120 h.p. for same job.*

SAVES TOOLS: *On work cleaned with ROTOBLAST, cutting tools last up to ⅔ longer because no scale is left to dull edges.*

... and these savings mean INCREASED PROFITS for you!

Look to Pangborn for the Latest Developments in Blast Cleaning and Dust Control Equipment

MORE THAN 25,000 PANGBORN MACHINES SERVING INDUSTRY

BLAST CLEANS CHEAPER

with the right equipment for every job

ANOTHER CASE OF *Champion* COST CUTTING

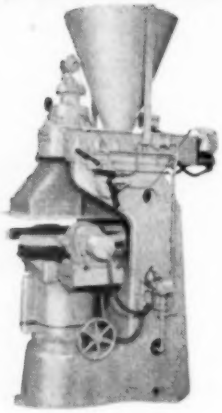
BIG CORES, PRODUCED FASTER, MORE ACCURATELY . . .
AT A HUGE SAVING

Possibilities of production improvement and cost reduction, through the "Champion method," are well illustrated in the case of a large Midwestern foundry where these views were taken.

Core A, which was made in halves and pasted together, is now blown in one piece, and production has gone up several times, with a very substantial saving in costs. Results obtained with core A proved the practibility of blowing core B, somewhat heavier, also in one piece. Dimensional tolerances of $\frac{1}{32}$ in. are held with ease.

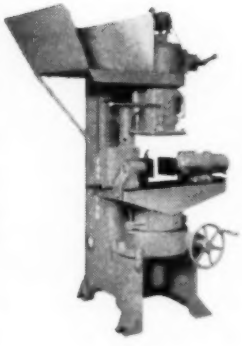
CHAMPION CB 400 CORE BLOWER, "THE BIG BOY"

CB 18



CB 15

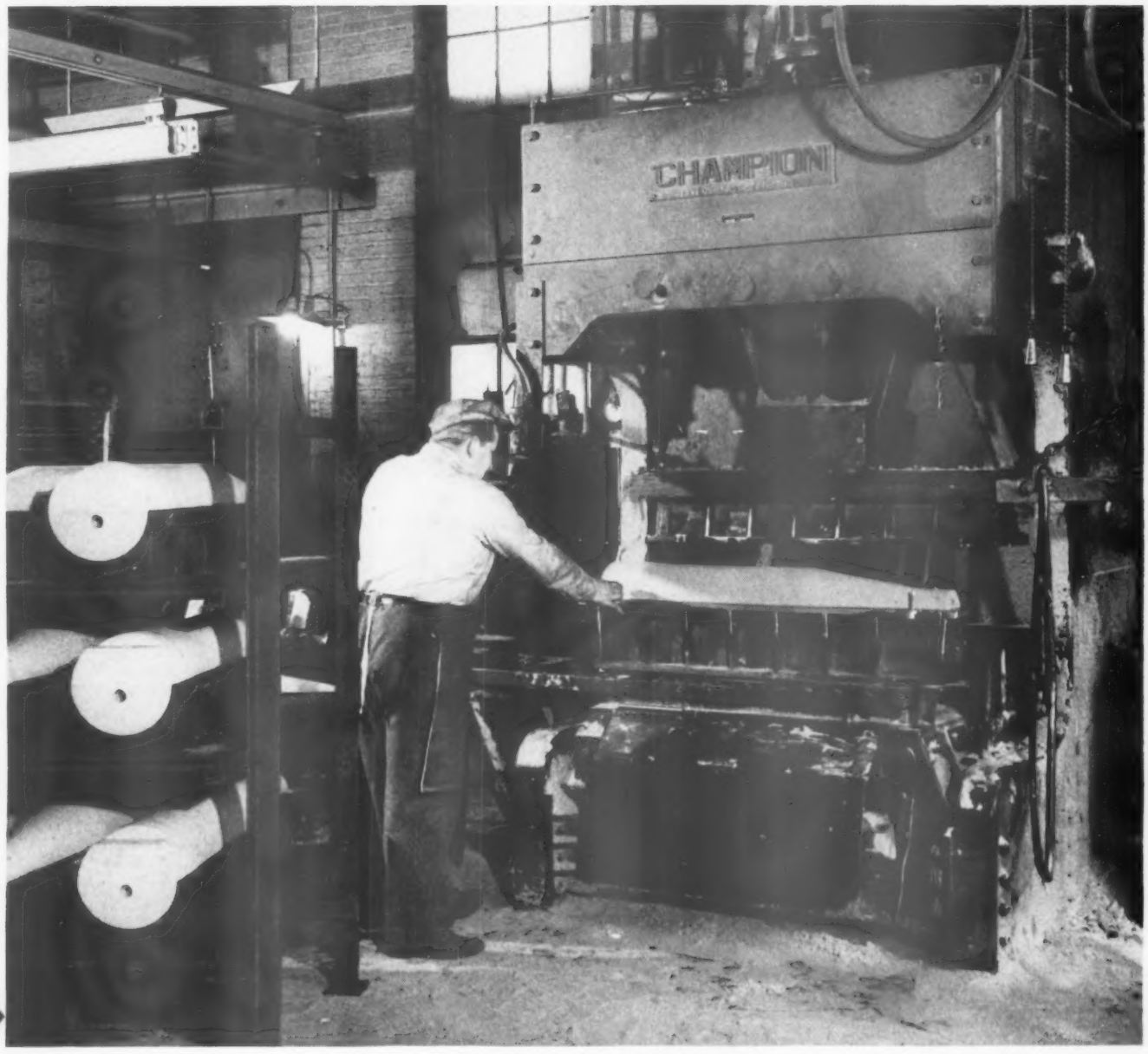
CB 12



CB 10

CB 5, "JUNIOR"

Examples of time and money savings, of quality improvement, are the usual thing in foundries, large and small, where Champion core blowers and molding machines are used. Let our production specialists show you where and how the Champion method, and Champion machines, can accomplish similar results for you.



Does manpower shortage threaten? Do higher operating costs keep you awake nights? Increase the productivity of your workers, and improve the quality of your product through better cores and molds, made the Champion way!

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THE ELECTRIC RIDDLE

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FOR BETTER GRAY IRON CASTINGS

FERROCARBO Briquettes are manufactured under U. S. Patents 2,119,521 and 2,497,745. The process of making cast iron through utilization of silicon carbide is registered under U. S. Patent 2,020,171.

CARBORUNDUM

"Carborundum" and "Ferrocarbo" are registered trademarks which indicate manufacture by The Carborundum Company

CUT THE NUMBER OF MIS-RUNS

	Untreated Iron	Treated with FERROCARBO Briquettes
Number of Days	11	12
Number Pieces Cast	29,939	31,913
Number of Mis-runs	1,317	723
% Mis-runs	4.48	2.28
% Decrease		49%

● Actual field tests show how use of FERROCARBO Briquettes cuts number of mis-runs in half. This plant makes large numbers of castings containing thin sections.

FERROCARBO Briquettes are a specially processed type of silicon carbide for metallurgical use. Added in the cupola, their effective deoxidizing action increases fluidity of the iron at casting temperatures. This substantially reduces the number of mis-run castings.

The advantages of using FERROCARBO Briquettes are becoming increasingly apparent to foundrymen. Let our distributors give you complete details.

FERROCARBO Briquettes

The effective cupola deoxidizer

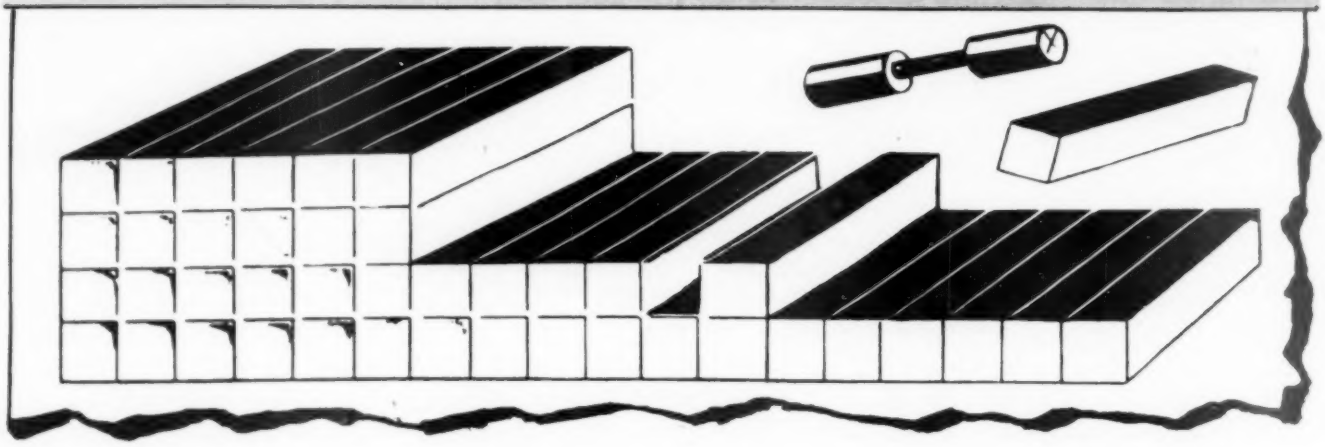
by CARBORUNDUM

TRADE MARK

THE CARBORUNDUM COMPANY, Bonded Products and Abrasive Grain Division, Niagara Falls, New York

FERROCARBO Distributors: KERCHNER, MARSHALL & CO., PITTSBURGH, Cleveland, Birmingham, Philadelphia and Buffalo; MILLER AND COMPANY, CHICAGO, St. Louis and Cincinnati; WILLIAMS AND WILSON, TORONTO, Montreal and Windsor.

If You Want the QUALITY of the TEST BAR in Your Castings— *Use* FRONTIER 40-E ALUMINUM ALLOY!



ORDINARILY the physical properties of an aluminum-alloy casting are less than those of a separately-cast test bar. But because of the special qualities of FRONTIER 40-E — the *non-heat-treated* aluminum alloy — you can be sure that *the same high qualities which show up in the test bar will appear uniformly throughout a large casting.* The following tables tell the story:

40-E Step Block Casting Cut Into 42 Test Bars—Physical Properties of each Shown in Squares.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Y.S.	22.5	20.0	21.2	20.6	20.5	22.0	20.8	21.0	21.8	22.5	23.0	23.4	23.0	25.0	23.8	22.5	23.5	24.6
T.S.	38.3	33.0	33.1	32.7	33.8	36.0	33.8	32.5	33.5	34.5	34.0	37.2	37.8	39.0	36.8	36.5	36.7	40.0
El.	12.5	10.0	6.0	4.0	7.5	7.5	8.0	7.0	7.0	7.5	7.0	8.0	8.5	8.5	7.5	8.0	7.5	10.0

	30	29	28	27	26	25	24	23	22	21	20	19
Y.S.	22.0	23.0	22.5	21.5	22.5	23.5	22.5	43.5	23.5	23.8	22.8	23.8
T.S.	36.3	35.3	35.3	35.0	35.0	37.3	34.5	32.0	32.5	32.5	35.0	38.3
El.	10.0	6.0	9.0	7.5	7.5	6.0	5.0	5.0	5.0	5.0	7.5	7.5

SEPARATELY-CAST TEST BAR PROPERTIES		
Nat. Aged 21 days	Y.S.	23500
	T.S.	36600
	El.	7.5

	31	32	33	34	35	36
Y.S.	23.0	22.8	22.5	24.0	23.5	23.0
T.S.	36.3	33.3	32.5	32.5	36.3	39.0
El.	8.0	5.0	5.0	5.0	7.0	8.5

	42	41	40	39	38	37
Y.S.	23.3	23.7	23.0	23.2	23.0	22.5
T.S.	33.2	37.1	36.4	37.3	38.0	40.8
El.	3.0	8.0	6.5	6.5	11.0	11.0

Properties of Casting (based on tensile strength readings)

	Maximum	Minimum	Average
Y.S.	22,500	22,500	22,700
T.S.	**40,800**	**32,500**	**35,500**
El.	11.0	5.0	7.5

Write TODAY for full details about Frontier 40-E Aluminum Alloy, including FREE DATA BOOK.

40-E Meets These Government Specifications:

U. S. Army-Navy Air Corps	AN-A-17
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U. S. Navy, Bureau of Ships	46A1F Class 1 (Int)
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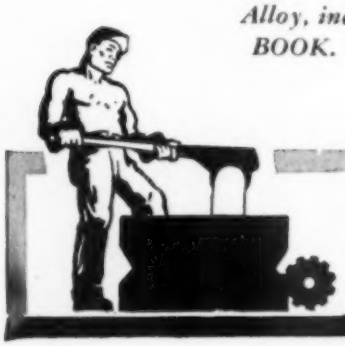
S. A. E.	310
U. S. Army Ordnance	AXX-1348



FRONTIER BRONZE CORPORATION

4878 PACKARD ROAD, NIAGARA FALLS, NEW YORK

This Foundry is a Good Place to Work

General Electric Company Steel Foundry – Everett, Massachusetts

THIS STEEL FOUNDRY, the largest in New England, contains 309,265 sq. ft. of floor space on 27 acres of land.

Steel castings produced here are for steam turbines, up to 15,000 kilowatt capacity, and railway electric motors. Shipping weights vary from one to 30,000 pounds. Many castings are extremely intricate in design.

There is ample evidence of the company's desire to make this foundry a good place to work:

1. An expenditure in 1948 and 1949 of a million dollars for labor-saving equipment and equipment to accurately control mixing, distribution and reclamation of molding sand;
2. A resultant improvement in working conditions;
3. Establishment of many safety records for its particular class of heavy industry in Massachusetts;
4. Good Housekeeping inspections, made at regular intervals, keep conditions at high level.

This foundry is one of eight operated by General Electric in the eastern portion of the U. S.

The Herman Molding Machine illustrated is typical of many used by General Electric to attain high quality, and fast production. These machines, like all Hermans, are reliable and adaptable to a wide range of casting sizes. They are ruggedly built and simple to operate. Automatic lubrication reduces maintenance to a minimum.

Best proof of their contribution to better production in foundries everywhere is that *they've made their way by the way they're made.*

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

Herman MOLDING MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

from this...

to this in 27 years...

HINES

POP-OFF FLASKS

(PATENTED)

the finest flask equipment in the world

Hines "Pop-Off" Flasks are fully protected by patents and patents pending.

THE HINES

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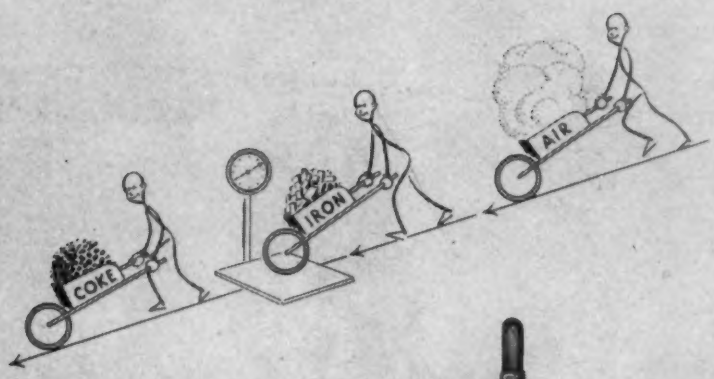
A Four Part Pop-Off Flask
Made by Hines
14"x14" at Center Joint
32" High

S FLASK CO.

CLEVELAND 11, OHIO

Foundry costs come down

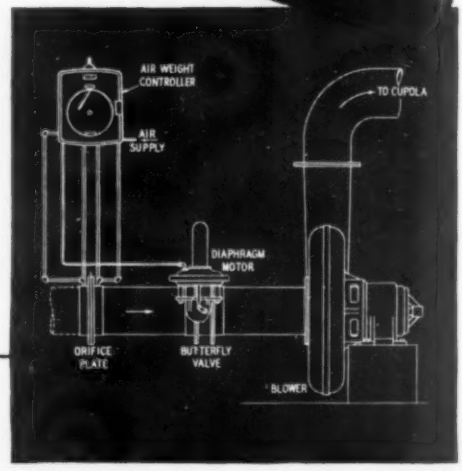


...when you weigh air too

Leading foundries report lower fuel costs, fewer rejects, and less pigging after installing Foxboro Air Weight Control. That's because the cupola blast is fully compensated for every change in atmospheric pressure and temperature. *The right amount of oxygen for the quantity of coke charge* insures better combustion, more uniform heats and better quality castings.

Foxboro Air-Weight Controllers automatically control cupola blast by *weight of air* instead of volume. They are one of Foxboro's many original developments in instrumentation to cut industrial costs. Representative installations will be found throughout the foundry industry. The names of those located nearest you will be gladly sent on request.

Now, . . . you can make the most of modern foundry practice by installing the advanced-design Model 40 Air-Weight Controller by Foxboro. Installation is easy and fast. Results will far outweigh the investment. Write for complete details. **The Foxboro Company, 32 Neponset Avenue, Foxboro, Mass., U. S. A.** Branches in principal cities.



Typical installation set-up of Foxboro Air-Weight Control . . . readily adaptable to either a centrifugal blower (shown in diagram) or a positive displacement blower.

FOXBORO REG. U. S. PAT. OFF. **AIR-WEIGHT CONTROLLERS**

no "hermit thinking" here

To keep our products constantly improved we believe that our ideas must be "cross-fertilized" with ideas from the users of these products. We do not work in solitary confinement but in the running stream of industry among men of ideas. This, we believe, is the only way to keep our thinking fresh, strong, and constructive. By always reaching out for new ideas and better methods our products reflect the combined thinking of some of the most capable and experienced men in industry.

TRU-STEEL* lasts 625% longer for this user

SAVES 3007 LBS. OF ABRASIVE IN 107 HOURS

COMPARISON CHART

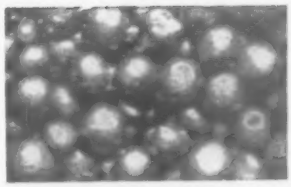
MACHINE: 36" x 42" Wheelabrator Tumblast
PRODUCTS CLEANED: Gray Iron Castings

	TRU-STEEL	CHILLED IRON
Wheel Hours Tested	107	94
Abrasive Used	550 lbs.	3125 lbs.
Abrasive Per Wheel Hour	5 lbs.	33.24 lbs.
Abrasive Per Load	.54 lbs.	3.92 lbs.

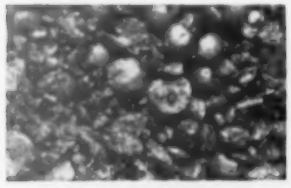
Sinking Spring Foundry Co., Sinking Spring, Pa., is another in a long list of foundries that has switched to Tru-Steel Shot with very profitable results. They made their own test and found they use 85% less shot when they use Tru-Steel. They found, too, that maintenance costs are greatly reduced because machine parts last so much longer.

Your own test will show you how much you can save. Write today for full information.

*Tru-Steel Shot is manufactured by Steel Shot Producers, Inc., Butler, Pa.



TRU-STEEL
No. 230 at Mag. 10X
After 1,500 Passes



CHILLED IRON
No. 230 at Mag. 10X
After 50 passes

American WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St. MISHAWAKA 2, INDIANA

please turn page

dust control costs less with **DUSTUBE**

at SIBLEY MACHINE & FOUNDRY CO., South Bend, Indiana

"THE ECONOMY OF THE DUSTUBE IS ESPECIALLY HELPFUL"

Mr. William C. Wine, Foundry Supt.

"The true cost of adequate dust control is not only in its initial cost but the total service and maintenance costs must also be considered. On this score the two Dustube Collectors have an exceptionally favorable low cost. In fact, except for regular routine inspections we have had no expense in connection with the units. In these days when costs are so closely watched, the economy of the Dustube is especially helpful."

"A BETTER, HEALTHIER PLACE TO WORK"

Mr. E. S. Wegenke,
Chief Inspector and General Foreman

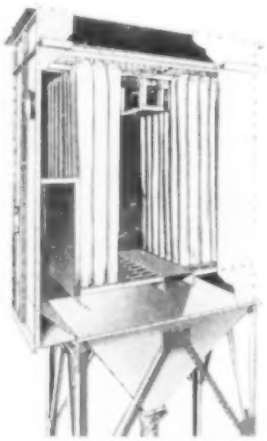
"Working conditions in our Foundry are especially important in our employee relations and naturally we want to provide every possible device to improve these conditions. The high efficiency of our Dustube Collectors is an important factor in making our cleaning room a better, healthier place to work."

"MAINTENANCE IS EASY AND INEXPENSIVE"

Mr. R. H. French,
Maintenance Foreman

"For the amount of dust our Dustube Collectors handle daily, the little attention they require is unusual. Maintenance is easy and not expensive with few working parts to wear. We have not had to change a cloth tube in the four years we have used the Dustube — this is probably due to the fact that the tubes are never under tension or in contact with metal which would corrode or abrade the cloth fabric."

dustube advantages



1. **BETTER DUST REMOVAL** — Simple, fast, thorough. Shortens cleaning time.
2. **POWER SAVINGS** — Lower resistance to air flow. Lower air velocities.
3. **HIGH EFFICIENCY** — Nearly 100% efficient by convincing tests.
4. **EASE OF INSPECTION** — Clean, safe, simple. No parts to remove.
5. **LESS FILTER WEAR** — No abrading metal contact. Easy to ship, store and handle.
6. **FASTER FILTER REPLACEMENT** — Takes only few seconds. Requires no tools.

please turn page

MANUFACTURING LICENSEES for Continental Europe: George Fischer, Ltd., Schaffhausen, Switzerland; for British Empire, excluding Canada: Tilghman's Patent Sand Blast Co., Ltd., Broadheath, Nr. Manchester, England. SALES REPRESENTATIVES: Brazil — Equipamentos Industriais "Elsa" Ltda.; Argentina — Clarfix S. R. L.; Mexico — Casco S. De. R. L.; Puerto Rico — Angel Cobiella.

American
WORLD'S LARGEST

WHEELABRATOR® tumblast

saves $3,807 a year

for CASTING SERVICE CO., La Porte, Indiana

One Wheelabrator Tumblast replaced 5 tumbling mills at Casting Service Company and reduced cleaning costs $2.11 per ton. The Wheelabrator cleans the same quantity of gray iron and semi-steel castings in 4½ hours that formerly required 9 hours in the 5 machines.

The job the Wheelabrator is doing is summed up by Mr. Sparks, Cleaning Room Foreman, in this manner: "We are more impressed every day with the cleaning performance of our Wheelabrator Tumblast. The speed and thoroughness with which our castings are now cleaned is much faster and better than when tumbling mills were used — this is reflected in our greatly decreased cleaning costs, and orderly condition of the cleaning room. Our customers are favorably impressed with the silvery finish on their castings."

One Wheelabrator often does a bigger, better cleaning job than several cleaning machines of other types . . . and just as often, it saves its cost in 6 to 18 months. You can make these savings in your plant, too. Write today for complete details.

cost comparison chart

	FORMER METHOD	WHEELABRATOR METHOD
machines	5 tumbling mills	36" x 42" Wheelabrator Tumblast (11½ cu. ft. capacity)
production	7.2 tons in 9 hours	7.2 tons in 4½ hours
labor requirements	2 men, 9 hours each = 18 man hours	2 men 4½ hours each = 9 man hours
cleaning cost	$4.18 per ton	$2.07 per ton

savings

per ton	per day	per year
$2.11	$15.23	$3,807

THE AMERICAN MOLDER

FEMA

WHEELABRATOR & EQUIPMENT CORP., 505 South Byrkit Street Mishawaka 2, Indiana

BUILDERS OF AIRLESS BLAST EQUIPMENT

please turn page

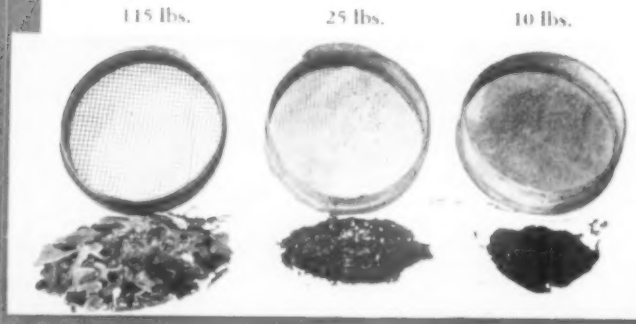
Sandmaster decreases scrap losses

at Zenith Foundry Co.

West Allis, Wisconsin

This Sandmaster removed 150 lbs. of iron from a single windrow at the Zenith Foundry Company in the first night of operation.

REMOVES 150 LBS. OF IRON FROM A SINGLE SAND HEAP



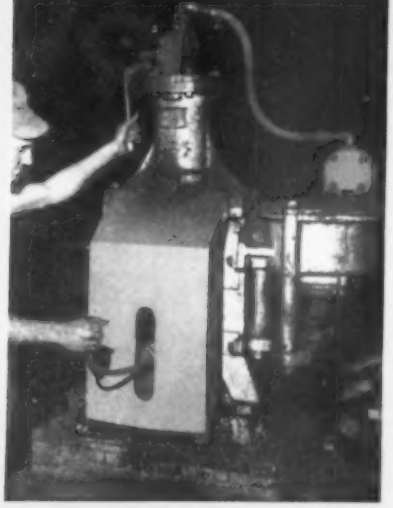
The first night the new Sandmaster was used at Zenith Foundry Co., more than 150 lbs. of iron were magnetically separated from a single windrow 30′ long and 60″ wide at the base. The iron removed consisted of 115 lbs. of large pieces, 25 lbs. of medium size scrap and 10 lbs. of tramp iron. Mr. W. R. Tanner, president of the company, estimates that decreased scrap losses alone will pay for the Sandmaster in several years' time.

The Sandmaster performs 4 important and necessary sand conditioning operations at once. It mixes and cuts the sand, imparts a mulling action, magnetically separates and then screens. In addition it will pile the entire heap beside the molding machine or between the benches as desired.

If you are interested in having your molders turn out more and better castings, then you will be interested in the new Sandmaster. Write today for Bulletin No. 45.

SAND CONDITIONING HEADQUARTERS FOR 43 YEARS

American Core Rod Straightener saves its cost in from 3 to 6 months



Why waste critical manpower for hand straightening core rods when a Core Rod Straightener will do the job for you at much lower cost. You can conserve your manpower and save money too just as these foundries have: A Chicago foundry saved 50% on the purchase of new materials and by replacing costly hand-straightening, saved over 2,000 man hours yearly with a Core Rod Straightener. Another foundry reports that: "One old man, ready for a pension, straightens all the rods and gaggers on an "F" machine. We formerly employed 4 men with anvils to do this work."

On an average, an American Rod Machine will pay for itself in 3 to 6 months' time through elimination of waste in labor and materials. Write for full details.

please turn page

American WHEELABRATOR & EQUIPMENT CORP.

505 S. Byrkit St. MISHAWAKA 2, INDIANA

Rewarding work!

NI-ROD saves iron castings . . . makes *machinable* welds

But for Ni-Rod electrodes, this pump body would have been scrapped at the foundry. The built-up area of the flange facing is almost indistinguishable from the original cast iron. Machining, drilling and tapping of the Ni-Rod weld deposit were no more difficult than similar operations in cast iron.

In the photograph above, you see a 45-pound gray iron pump casing that was rejected because a small area of the flange failed to fill during pouring.

Instead of being scrapped, the casting was sent to the plant's welding department. There, with Ni-Rod® electrodes, the defective flange was built up and the repaired casting was passed to the machine shop where it was finished like a regular production piece.

Salvage operations like this with Ni-Rod save time and money.

Ni-Rod gives fast, crack-free, non-porous welds that are a close color match for gray iron . . . and welds that are as *machinable* as the iron itself. Slag removal is easy. And Ni-Rod is stable-arcing in all positions with either AC or DC current.

Another important Ni-Rod feature . . . preheating or post-heating is seldom necessary.

Why not try Ni-Rod in your own shop . . . soon? Discover for yourself why *4 out of 5 shops* re-order Ni-Rod, once they've tried it.

Your nearest INCO distributor stocks Ni-Rod in 3/32", 1/8", 5/32", and 3/16" diameters.

FREE – 8-page booklet:
"NI-ROD . . . a new electrode for any cast iron welding."

For welds you've never been able to make before . . . in high-phosphorus irons; heavy sections—

NI-ROD "55"

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

EMBLEM OF SERVICE
INCO NI-ROD TRADE MARK

NI-ROD DISTRIBUTORS

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Whitehead Metal Products Company, Inc.
Wilkinson Company, Ltd.
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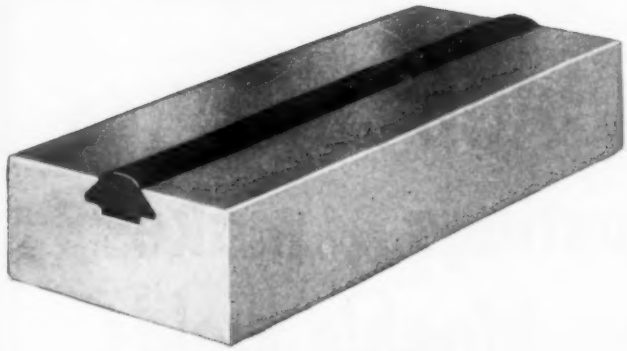
Save CORES & CORE BOXES TIME & MONEY

MARTIN ENGINEERING COMPANY LEADS THE WAY AGAIN



"PROTEXABOX" PINS

Will not loosen—cannot mar box face. Protective rubber tip guaranteed to stay on.

"STRIPINSERT"

Protects parting line—easily installed in old or new boxes. Eliminates steel facing.
NOW! NEW! Cutters for groove available at moderate cost.

"HOLINER" BUSHINGS

Stop abrasion between blow plate and core box. Protect blow holes.

"SAND ARRESTER TUBES"

Perfect cores every time! Guaranteed for 100,000 blows!

"PULLINSERT" BLOW BUTTONS

Available in nine popular sizes—positively stop sand blasting under blow holes.

"VIBROLATOR"

Draw cores without damage. Guaranteed to feed sand from any hopper.

Trade-Marks and Patents Applied for

YOUR JOBBER WILL BE HAPPY TO SHOW YOU ANY OF THESE MONEY-SAVING PRODUCTS.

Folders describing the above products available on request.

MARTIN ENGINEERING COMPANY

KEWANEE 2, ILLINOIS

APEX

Z-50

ALUMINUM ALLOY

Your production line is your profit line—safeguard it by using APEX Z-50, a proven quality alloy. Having uniform casting characteristics with better-than-average mechanical properties, *and free machinability,* APEX Z-50 will meet most of your casting requirements. When quality plus economy is paramount, specify APEX Z-50—"Proved Best By Test"!

Apex Smelting Company

Chicago • Cleveland

2537 WEST TAYLOR STREET • CHICAGO 12, ILLINOIS
6700 GRANT AVENUE • CLEVELAND 5, OHIO

TAM

Zircon grog type ramming mix

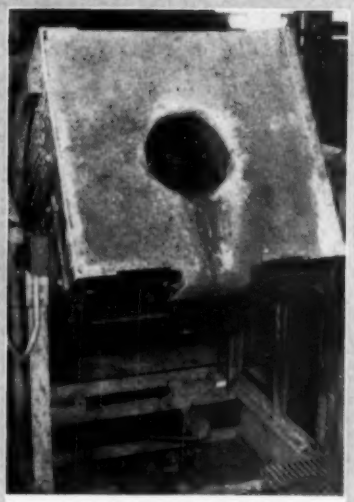
Pouring heat from Allis Chalmers induction furnace at Michiana Products Co.

LASTS 4 TO 5 TIMES LONGER

In these 600 lb. capacity Allis Chalmers induction furnaces operated by the Michiana Products Co. of Michigan City, Indiana . . . TAM zircon grog type ramming mix provides excellent lining service. This extended life is realized in melting a variety of alloys ranging from low carbon stainless to heat resisting alloy with nickel contents from 3 to 65% and chrome contents from 8 to 30%.

Resistance to high temperatures and the difficult melting conditions involved is due to the superior characteristics of this lining material. More metal is melted at less cost per ton. That's why it pays to get the full facts on TAM ramming mixes. They may be obtained readily from our field engineers or by addressing your inquiry to our New York office.

The same furnace as lined wet with zircon lining.



Furnace ready for relining after 100 heats.

TAM PRODUCTS
Registered U. S. Pat. Off.

TAM is a registered trademark

TITANIUM ALLOY MFG. DIVISION
NATIONAL LEAD COMPANY

Executive and Sales Office: 111 BROADWAY, NEW YORK CITY · General Offices, Works, and Research Laboratories: NIAGARA FALLS, N. Y.

Work your foundry from top to bottom

...with LINK-BELT Overhead Trolley Conveyors

Pouring molds on the run without danger to workers . . . smooth, synchronized handling of castings from molding stations through shipping . . . cores transported to foundry operations . . . sprue dumped automatically at discharge stations are all representative functions of mass production by Link-Belt Overhead Trolley Conveyors.

Link-Belt Overhead Trolley Conveyors, bending up, down or around as required . . . at predetermined speeds, provide "straight-line" production regardless of physical layout.

Gain more floor space by using previously wasted ceiling area, step up production, cut operating costs, release workers to more productive jobs. Ask our experienced Link-Belt foundry engineers about the unlimited possibilities of Link-Belt Overhead Trolley Conveyors in your foundry. Quickly installed.

Upper left: Link-Belt Overhead Trolley storage conveyor handling finished cores to mold assembly lines.

Above: Over 1¼ miles of Link-Belt Overhead Conveyors are used in this plant for handling castings from shakeout to shipping.

LINK-BELT COMPANY

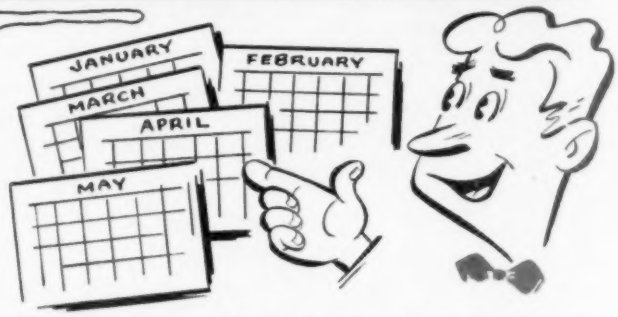
Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8.
Offices in Principal Cities. 12.080

LINK-BELT

OVERHEAD TROLLEY CONVEYORS

Lynchburg Foundry* SAVES 56.7% on BLAST CLEANING with Malleabrasive!

* *Results of Malleabrasive test conducted by Lynchburg Foundry Co. of Lynchburg, Va., as reported by The Globe Steel Abrasive Co.*



To get the facts on Malleabrasive, Lynchburg Foundry set aside 16 weeks for comparative tests to check cleaning costs before and after using Malleabrasive.

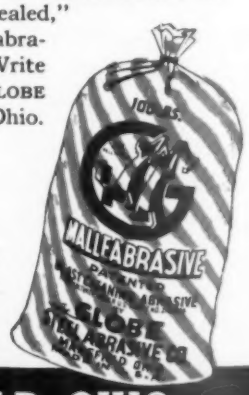
The results were amazing! Lynchburg's impartial tests proved 100 lbs. of Malleabrasive does the work of 230 lbs. of ordinary shot or grit . . . an actual saving of 56.7% hourly!

Further checks on cleaning costs showed Malleabrasive saved $7.38 out of every $10.00 Lynchburg formerly spent for replacement parts. But that's not all . . .

After all test results were in, Lynchburg Foundry found the switch to Malleabrasive means an actual cash saving of $2,995.00 a year—all clear profit.

TEST MALLEABRASIVE YOURSELF!

If you want to save money on blast cleaning, take advantage of this offer! We'll send you all data needed to run a comparative test *just like Lynchburg's* right in your own cleaning room! Remember, Malleabrasive is *guaranteed* to outperform ordinary shot and grit when comparative tests are properly run. Malleabrasive is more than "heat treated" or "annealed," Malleabrasive is a radically new abrasive. But find out for yourself. Write for TEST INFORMATION to: THE GLOBE STEEL ABRASIVE CO., Mansfield, Ohio.



†U. S. Patent #2184926
(other patents pending)

Save on blast cleaning with

MEMBER FEMA

PATENTED†

Malleabrasive®

THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO

· MANUFACTURERS OF METAL ABRASIVES SINCE 1907 ·

SLASHES CORE COSTS!

Cuts Core Making Time from Days to Minutes

HERE'S A REVOLUTIONARY new way of making cores in one step. It replaces the time consuming steps of the conventional core making process shown in the drawing above. Cores can now be dried in minutes instead of hours . . . and cooling, curing and storage are not needed. It means savings of time, space and labor.

Instead of placing cores on collecting racks, core maker places them directly onto moving conveyor belt of *Foundromatic* Sand Core Dryer. *One step eliminated!* Cores come out of dryer a few minutes later cool enough to be handled with bare hands, and can go directly to the molder. *Two more steps eliminated.* Cuts out cooling rack, and storage rack. Reduces handling, breakage and floor space.

In addition, you'll enjoy speed and cleanliness. It takes up to 80% less time to dry cores — and they all come out perfect — without overbaking. Burning of fins or thin sections is eliminated! Working conditions improved too. Fumes and heat are gone from the core room. And in addition, you'll save 30 to 60% on fuel.

For complete information, outline your requirements to your nearby A-C Sales Office, or send in the coupon.

Foundromatic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

ALLIS-CHALMERS, 1032A SO. 70 ST.
MILWAUKEE, WIS.

Please send me information on the *Foundromatic* Sand Core Dryer.

Name.....

Title.....

Company.....

Street.....

City..... State.....

A-3085

New . . . . Improved

DELTA CORE & MOLD WASHES

SPEED PRODUCTION OF BETTER, CLEANER CASTINGS AT *Lower Cost*

Three easy-to-understand reasons why more foundries use DELTA Core and Mold Washes . . .

1. **MORE PERFECT CASTINGS . . .**
2. **LOWER CLEANING ROOM COSTS . . .**
3. **LESS SCRAP IN MACHINING.**

DELTA CORE AND MOLD WASH-BASE
Mix with silica flour and water to produce finished wash.

•

FOR STEEL
STEELKOAT — Special Core and Mold Wash.

•

FOR GRAY IRON AND MALLEABLE
Grakoat — Blackoat — Hi-temp.

•

FOR GRAY IRON
Blackoat S-5 — A new and different wash.

•

FOR NON-FERROUS METALS
Non-FerrusKoat.

•

FOR ALL SAND CAST METALS
THERMOKOAT — It's Plasti-Lastic.
PYROKOAT-HI-Speed.

•

FOR UNUSUALLY HIGH TEMPERATURE CONDITIONS
Z-KOAT — High-fusion-temp. Wash.

•

There is no "just as good" substitute for any DELTA Core and Mold Wash just as there is no substitute for DELTA'S scientific laboratory control of production which safeguards the quality and uniformity of all DELTA Foundry Products. DELTA Research laboratories developed, and pioneered the use of, Plastic-type Core and Mold Washes . . . and still leads the field in the development of new products for improved foundry practices.

NEW mechanical processing and improved chemical formulation . . . developed by DELTA Research . . . have resulted in many decided advancements in both the quality and characteristics of DELTA CORE and MOLD WASHES.

Maximum uniformity of surface coverage is obtained with lower Beaume mixes, using more water. Penetration characteristics are THREE times greater (from 10 to 12 grains deep) and the density of the wash on the surface has been increased 40%.

Due to increased surface density the rate heat conductivity is speeded up and metal in contact with the washed surfaces cools more rapidly, resulting in smoother casting finish.

HERE'S WHY

a. Delta Core and Mold Washes "Anchor" themselves by penetrating from 10 to 12 grains deep into the sand. This bond between the wash and the sand . . . a distinctive DELTA characteristic . . . produces an expansion-resisting coating essential to the production of finer finished castings.

b. The hot strength of Delta Core and Mold Washes increases with each degree of temperature rise from 1800°F to 3000°F providing maximum critical hot strength for all foundry applications.

The higher hot strength of DELTA Core and Mold Washes eliminates surface sand fissuring, excessive sand expansion and distortion.

c. No gas leakage through Delta Core and Mold washed surfaces. Gases produced by decomposition of organic binders in the core sand cannot leak through Delta Core and Mold washed surfaces to contact the molten metal. Only Delta Core and Mold Washes provide this unique and all-important insurance against defective castings resulting from core gas leakage. DELTA Core and Mold Washes insure more perfect castings with finer finished surfaces.

● *Ask for a liberal working sample. You will also receive complete data on how to use DELTA Core and Mold Washes in your foundry.*

DELTA OIL PRODUCTS CO.

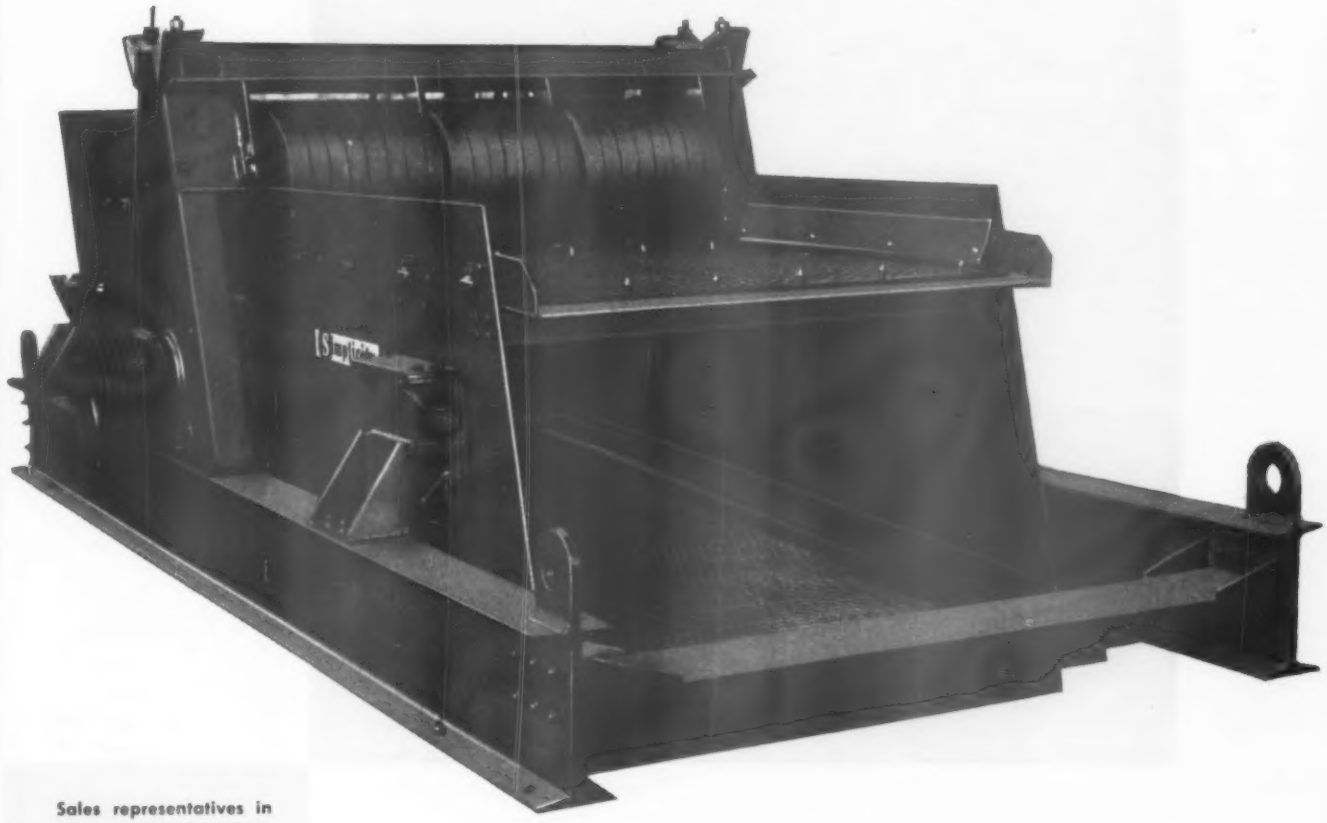
MILWAUKEE 9, WISCONSIN

how one $5,000 crusher installation saved $30,000

Anyway you count it, $30,000 is a lot of money . . . especially for a $5,000 installation to save over a period of three years. But that's exactly the story behind one of the first Simplicity Ring Crushers that was installed in a large automotive foundry. During the first three years, the foundry management actually saved $30,000 in new sand purchases due to the effective job done by the Simplicity Crusher on usable sand recovery.

In another instance, also in an automotive foundry, two small Simplicity Crushers, a 2′ x 6′ and a 3′ x 8′, are making anticipated savings of $40,000 in good sand recovery, retrieved metal and eliminating of a disposal problem.

We believe we can save you money, too, with Simplicity equipment, and would appreciate the opportunity to sit down and talk over your plans and problems. There's a Simplicity sales engineer near you.



Sales representatives in all parts of the U.S.A.

FOR CANADA: Canadian Bridge Engineering Co., Ltd., Walkerville, Ontario.

FOR EXPORT: Brown & Sites, 50 Church St., New York 7, N. Y.

implicity

TRADE MARK REGISTERED

ENGINEERING CO. • DURAND, MICHIGAN

NEW B&W ALLMUL FIREBRICK

Designed to Cut Furnace Costs

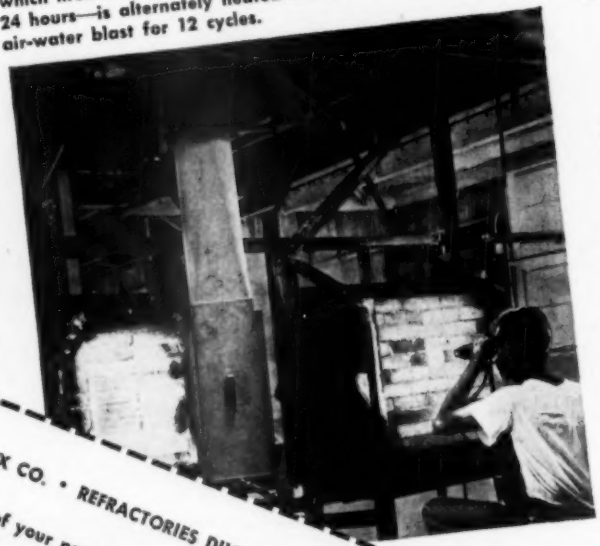
Now you can have the heavy-duty firebrick you always wanted . . . a practically pure mullite brick that costs far less than similar heavy-duty refractories.

It's the new ALLMUL Firebrick, designed to slash refractory costs by **eliminating frequent need for furnace relining,** by **cutting maintenance** and **saving valuable production time.** In fact, ALLMUL is designed to give you a new standard of economy and performance in furnace construction and operation.

If you are now using all-mullite type refractories, you will be surprised by the low initial cost of ALLMUL . . . at the over-all savings you can make with this practically pure mullite firebrick.

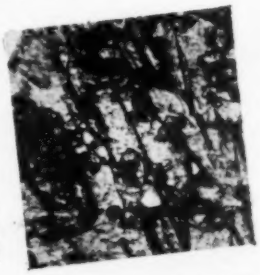
If you are using part-mullite refractories with the thought that top quality mullite refractories cost more than you could afford to pay, economical B&W ALLMUL Firebrick is well worth investigating.

ALLMUL shows no spall loss in the rigorous spalling test, in which firebrick—after first having been heated to 3000 F for 24 hours—is alternately heated to 2550 F and chilled in an air-water blast for 12 cycles.



WHAT IS MULLITE?

Mullite—a crystalline compound with the formula $3Al_2O_3 \cdot 2SiO_2$—is the *only* compound of alumina and silica stable at high temperatures. It's the ingredient which potentially gives firebrick a high melting point, high hot load strength, high resistance to spalling, and good volume stability. But unless ingredients are properly selected, proportioned and processed, mullite crystals are small, widely separated and often embedded in a matrix of silica. The valuable properties of mullite are thus lost.



ALLMUL, on the other hand, is nearly all pure, tough, interlocking mullite crystals, with a small amount of highly durable corundum, as shown in the photomicrograph, and it contains no free silica. This accounts for the truly amazing strength and heat resisting properties of ALLMUL.

Many Applications for NEW B&W ALLMUL

If heat is the heart of the operation, you'll find new B&W ALLMUL makes possible important economies. For example, ALLMUL can be used in glass tanks of all kinds; ferrous and nonferrous metal furnaces; ceramic kilns; enameling furnaces; chemical and petroleum furnaces; and in many other applications. Even under the most punishing service conditions, ALLMUL Firebrick withstands heavy loads and high temperatures. See how ALLMUL can cut refractory costs in your specific application.

NEW 4-page Bulletin gives you all the facts about ALLMUL Firebrick. Just clip coupon and mail today.

THE BABCOCK & WILCOX CO. • REFRACTORIES DIVISION • 85 LIBERTY STREET • NEW YORK 6, N. Y.

☐ Please send a copy of your new bulletin R-29 on ALLMUL Firebrick.

☐ I would like to see a B&W Refractories Representative.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____

STATE_____

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 85 LIBERTY ST., NEW YORK 6, N.Y.
WORKS: AUGUSTA, GA.

for maximum production

COLEMAN

for better work conditions

TOWER* OVENS

for lowest operating cost

Coleman Tower Oven in leading midwest steel foundry

Coleman Tower Oven baking cylinder head cores in automotive foundry

By installing Coleman Tower Ovens, foundries everywhere have increased production and improved coreroom working conditions, for these reasons:

PATENTED OPEN CENTER: Provides close, efficient grouping of coremakers around the oven. The exclusive 3-way loading feature increases accessibility 300% over ordinary vertical oven designs. Cuts carry time to a minimum—users report increased coremaker productivity of over 50%.

RECUPERATIVE COOLING SYSTEM: Cores are "smoked off" and cooled before they reach the unloading station, making for better working conditions. The heat recovered from the cores is used over again, resulting in large fuel savings.

AMAZING FLOOR SAVING: Baking is done overhead, providing larger core-baking capacity in 25% of the floor space required by batch type ovens. Indirect labor savings up to 75% are secured by the elimination of racks, trucks, aisle ways and inefficient congested work areas.

PERFECT BAKING: The Coleman heating system produces perfectly baked cores with unusual speed. No rejects...no make-overs...no defective castings due to improper core baking—further increasing production.

*Trademark Reg. U.S. Pat. Off.

For further information, write today for Bulletin 48

A COMPLETE RANGE OF TYPES:
COLEMAN OVENS are built in a complete range of sizes and capacities for every core-baking and mold drying requirement: Tower Ovens, Horizontal Conveyor Ovens, Car-Type Ovens, Transrack Ovens, Rolling Drawer Ovens, Portable Core Ovens, Portable Mold Dryers, etc.

THE FOUNDRY EQUIPMENT COMPANY

1831 COLUMBUS ROAD — CLEVELAND 13, OHIO

MEMBER FEMA

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

More than a "Separator"

PROTECTOMOTOR PIPE LINE FILTER DELIVERS *Clean* AS WELL AS *Dry* AIR

Rust, Pipe Scale, Dirt and Dust removed in addition to Water and Oil

Continual repeat orders from leading foundries prove the efficiency, long-life and all around economy of Protectomotor *Double Action* Pipe Line Filters. Simple to install, Protectomotors often save their entire cost in a single month.

Find out how Protectomotors can be used in *your* foundry for increased production at less cost—

WRITE FOR CATALOG

DOLLINGER CORPORATION

36 CENTRE PK. ROCHESTER 3, N. Y.

Air Filter Headquarters

FILTERS FOR PIPE LINE, ENGINE INTAKE AND BUILDING VENTILATION

Temperature Changes Mean Trouble in Unprotected Air Lines

Moisture in compressed air is condensed as the air passes through cold sections of pipe. Unless removed, this water washes out lubrication from air-powered tools, freezes upon expansion in these tools, and causes loss of power or stoppage due to clogging of parts; causes delays and waste at other points of compressed air usage. Staynew Pipe Line Filters (Protectomotors), installed as near point of use as possible, remove water and oil, preventing these troubles.

Model CPH

Double Action★Exclusive Construction

Air or gas strikes deflector (2), and is impinged against sides of housing (1). Oil, water, and heavy dirt particles drop to bottom and are drawn off thru drain (5). Fine dirt particles are removed from air or gas by positive action of the dry-type filtering medium which covers the patented Radial Fin Insert (4). Louvered housing (3) evenly distributes air or gas over surface of insert.

DOLLINGER REG. PROTECTOMOTOR U.S. PAT. OFF. STAYNEW FILTERS

Make Parting Easier
Cut Rejects
Reduce Foundry Smoke

USE **"dag"** dispersions in your foundry because they:

IMPROVE PARTING by preventing adhesion of cast objects to mold cavities and cores.

CUT REJECTS and finishing costs because castings are reproduced in the finest detail. Films formed by **"dag"** dispersions are smooth . . . resistant to heat . . . extremely durable, and will not measurably affect mold tolerances.

REDUCE SMOKE and give men in the shop a break, because aqueous **"dag"** dispersions do not give off clouds of smoke and choking fumes.

Spray or brush it on chills, dies, patterns, ladle interiors and permanent molds. Eliminate binding and stripping, too, by using **"dag"** colloidal graphite to lubricate push pins, shoulder screws, flask pins, or any screw threads.

Acheson Colloids is equipped to do custom disintegrating, dispersing, and stabilizing of solids in a wide variety of vehicles. If you are in need of this type of service, tell us about it. We may be able to help you.

ACHESON COLLOIDS CORPORATION
Port Huron, Michigan

☐ Send me the NEW Foundry Bulletin #425

☐ Send an Acheson engineer

NAME.....

COMPANY.....

STREET.....

CITY..... ZONE.....

STATE.....

L-14

dag DISPERSIONS

Acheson Colloids Corporation, Port Huron, Michigan

... also Acheson Colloids Limited, London, England

The Maytag Company Uses **Federated** Aluminum Ingot

The Maytag Company is one of the world's largest producer-users of aluminum castings. It uses about 23 million pounds a year at peak production . . . all cast in Maytag's own foundries.

Quality of product and speed of manufacture are essential factors in Maytag's continuing success. *To be sure* of realizing these objectives consistently, Maytag has used Federated aluminum ingot for many years. In fact, the special alloy supplied to the manufacturer is the result of the combined efforts of Maytag engineers and Federated research metallurgists.

The confidence and success that comes from using only the best materials can be yours, too. See Federated first for aluminum and magnesium alloys, for brasses and bronzes, hardeners, oxidizers . . . for help with any non-ferrous foundry problem.

Federated Metals Division

Federated first in the non-ferrous field — AMD

AMERICAN SMELTING AND REFINING COMPANY • 120 BROADWAY, NEW YORK 5, N. Y.

Winter Delivery

No longer is it necessary to have your production facilities reduced or hampered during the winter months. Our dealers will be in a position to supply you with either crude or dried crude silica sand all winter long. For the convenience of our customers we maintain production at one of our three pits twelve months in the year.

We are in business to sell tonnage of sand and we realize that our success depends on the results you obtain. We place our sand specialists at your disposal to help you correct difficulties which may have arisen through the use of sands not suited to your particular requirements. We specialize in semi-synthetic and synthetic sands for core room and molding practice and are able to supply you with the proper sand for your needs.

The American Silica-Sand Company has served the foundry industry for thirty years and our productive capacity enables us to supply your requirements, whether they be large or small.

Write or phone us. There is no obligation on your part. Give us the opportunity to cooperate with you on your sand problems.

Sold with SERVICE by these Dealers:

BRUMLEY-DONALDSON COMPANY
Box 336—Vernon Station,
Los Angeles 11, California

LLOYD CANFIELD
1918 North 17th Street,
Kansas City 2, Kansas

CARPENTER BROTHERS, INC.
606 West Wisconsin Avenue,
Milwaukee 3, Wisconsin

FOUNDERS SUPPLIES, INC.
1074 Ellicott Square Bldg.,
Buffalo 3, New York

FOUNDRIES MATERIALS COMPANY
Branch County Savings Bank Bldg.,
Coldwater, Michigan

GREAT LAKES FOUNDRY SAND CO.
United Artists Building,
Detroit 26, Michigan

INDIANA PRODUCTS COMPANY
400 Union Bank Building,
Kokomo, Indiana

THE KEENER SAND & CLAY CO.
515 Hartman Building,
Columbus, Ohio

MIDWEST FOUNDRY SUPPLY CO.
3430 Brighton Blvd.,
Denver 5, Colorado

WESTERN MATERIALS COMPANY
39 South La Salle Street,
Chicago 3, Illinois

WALTER A. ZEIS
2 Armin Place,
Webster Groves 19, Mo.

THE AMERICAN SILICA SAND COMPANY

Producers of Dried and Crude Silica Sands
OTTAWA, ILLINOIS
Telephone 18 or 29

Beat

Lagging Production—

Rising Costs

Adams 12"-38"
Jolt Squeezer
Portable Type

ADAMS MOLDING EQUIPMENT

You'll get more and better molds, faster and at less cost when you use Adams Molding Equipment. There is a complete range of Adams high quality custom-built flask equipment, designed to give longer life and better service. Adams Molding Machines give you uniformly perfect molds, high production at lower cost per man hour. They are made in a variety of sizes and styles to meet virtually every requirement. Adams experienced foundry engineers will gladly supply complete details. Write for Catalog 705.

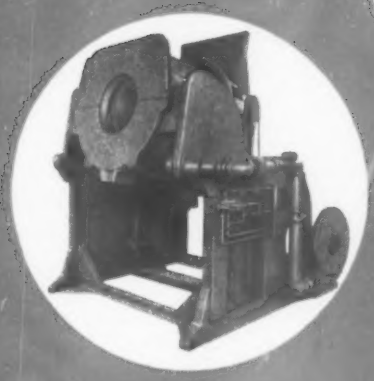
THE ADAMS COMPANY
700 FOSTER ST., DUBUQUE, IOWA

The ADAMS Company

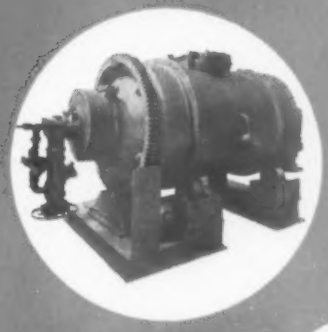
ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

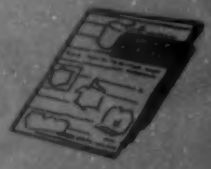
DUBUQUE, IOWA, U.S.A.



MELTING AND HOLDING FURNACES



Lindberg-Fisher builds all kinds of melting and holding equipment . . . gas . . . oil . . . electric . . . induction . . . arc and high frequency. Lindberg-Fisher engineers can intelligently and without prejudice recommend the proper type of furnace to best suit your needs and conditions.



Bulletin 551 covers the complete melting line. Write for your copy today.

LINDBERG-Fisher A DIVISION OF LINDBERG ENGINEERING CO.

2453 WEST HUBBARD STREET · CHICAGO 12, ILLINOIS

DRAVO HEATERS..

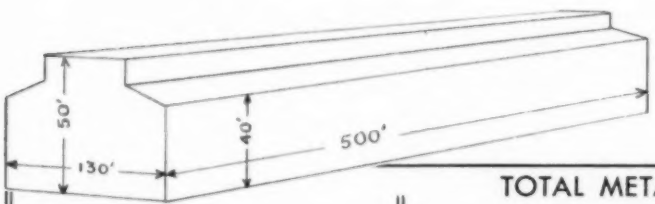
AS WELL AS MONEY....FUEL..

Heating system steel needs *can* be slashed from 50% to 70% for the representative open-space industrial structure shown below . . . by using the direct-fired warm air heating method with Dravo "Counterflo" Heaters! This conservation, of vital importance today, adds another to the long list of economies in money, fuel and labor effected by this heating method.

The chart below gives the detailed comparative story. Every system is equivalent in Btu output. Steel requirements for the 13 methods have been carefully and conservatively calculated.

It will be noted that Dravo Heaters not only take LESS steel in each fuel classification . . . but that the HIGHEST steel requirement in a Dravo installation is almost 50% less than the LOWEST steel requirement in any other system. Of special significance is the contrast in *pipe* required. Jobs now held up by slow pipe deliveries can MOVE . . . if Dravo Heaters are used!

Any time that YOUR jobs are delayed or deferred because of steel or pipe shortages, why not find out how Dravo "Counterflo" Heaters are expediting things for other users? And remember — steel savings are just *one* of the reasons that more and more Dravo "Counterflo" Heaters are heating increasing numbers and types of structures. You'll find many other good reasons listed at right, that will appeal to you.



Each heating system compared below was sized to make up a calculated 12,000,000 Btu heat loss in this representative industrial building.

TOTAL METAL REQUIREMENTS FOR VARIOUS HEATING SYSTEMS

COMPONENT	GAS FIRED					OIL	
	DRAVO WARM AIR	HIGH PRESSURE CONVENTIONAL WATER TUBE BOILER	HIGH PRESSURE PACKAGED STEAM GENERATOR	LOW PRESSURE CONVENTIONAL WATER TUBE BOILER	LOW PRESSURE PACKAGED STEAM GENERATOR	DRAVO WARM AIR	HIGH PRESSURE CONVENTIONAL WATER TUBE BOILER
BASIC HEAT GENERATORS	26,400	38,000	62,000	38,000	62,000	26,400	38,000
PIPING—Oil—Steam Boiler Room—Gas	9,096	15,490	15,490	35,308	35,308	4,352	15,790
TANKS—Oil—Blow-off Condensate		3,500	1,500	1,500	1,500	13,000	16,500
UNIT HEATERS including Traps & Starters		21,240	21,240	21,240	21,240		21,240
STACKS & BREECHING	1,200	4,000	400	4,000	400	1,200	4,000
PUMPS—Fuel Oil Auxiliary Oil—Boiler Feed		1,000	1,000	1,000	1,000	400	1,400
STOKERS & FANS— including Dust Collectors Fuel Oil Preheaters							2,000
STRUCTURAL STEEL Boiler House Foundation Reinforcing		7,000	2,000	7,000			7,000
TONS of STEEL REQUIRED	DRAVO 18	45	52	54	61	DRAVO 23	53

. . CONSERVE STEEL

. . AND MAN HOURS

DISTRIBUTION PIPING AND DIFFUSERS COMPLETELY ELIMINATED

LEAST STEEL PER 1,000,000 BTU OUTPUT

NO VALVES, TRAPS OR FITTINGS

STAINLESS STEEL CHAMBER ELIMINATES REPLACEMENT

DRAVO CORPORATION

HEATING DEPT., DRAVO BUILDING, PITTSBURGH 22, PA.
Sales Representatives in Principal Cities.
Mfd. and Sold in Canada by Marine Industries, Ltd., Sorel, Quebec.

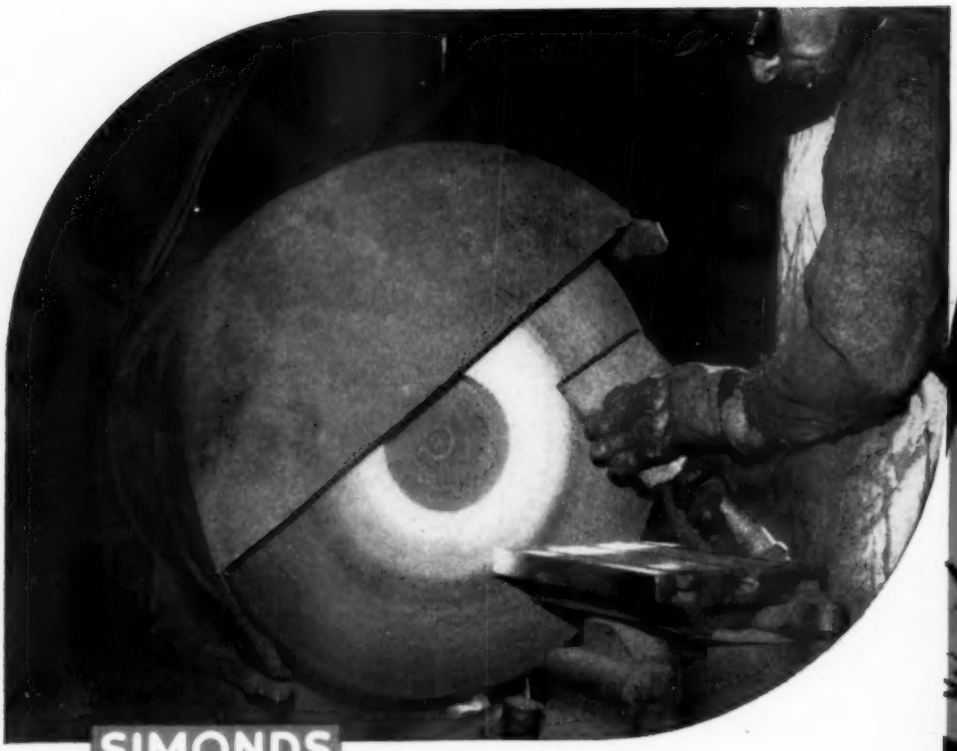
WITH IDENTICAL 12,000,000 Btu LOAD

← FIRED			COAL FIRED →		
HIGH PRESSURE PACKAGED STEAM GENERATOR	LOW PRESSURE CONVENTIONAL WATER TUBE BOILER	LOW PRESSURE PACKAGED STEAM GENERATOR	DRAVO WARM AIR	HIGH PRESSURE CONVENTIONAL WATER TUBE BOILER	LOW PRESSURE CONVENTIONAL WATER TUBE BOILER
62,000	38,000	62,000	27,450	38,000	38,000
15,790	35,608	35,608		14,990	34,808
14,500	14,500	14,500		3,500	1,500
21,240	21,240	21,240		21,240	21,240
400	4,000	400	1,200	4,000	4,000
1,000	1,400	1,000		1,000	1,000
	2,000		23,850	15,000	15,000
2,000	7,000			7,000	7,000
58	**62**	**67**	DRAVO **26**	**52**	**61**

DRAVO HEATERS HAVE EARNED HIGHEST ACCEPTANCE BECAUSE THEY

- *use less steel*
- *eliminate distribution piping*
- *have lower initial cost*
- *are very efficient in fuel consumption*
- *concentrate comfort heat at the working level*
- *reduce roof heat losses*
- *burn gas or oil*
- *are available in coal burning models*
- *save man hours through automatic operation*
- *require no attendant and negligible maintenance*
- *produce heat instantly and ONLY when needed*
- *have stainless steel chambers for longer life*
- *prevent rust and stain conditions in metal storage*
- *bear UL label and AGA approval*
- *require only stack, fuel and power line*
- *are portable and readily moved*
- *provide year 'round ventilation*
- *are ideal for process drying*
- *avoid freeze up worries, leaky traps, valves, etc.*
- *are shipped complete and flame tested*
- *can be installed on floor, wall or roof*
- *can be mounted upside down or horizontally*
- *eliminate ductwork with 150 ft. air throw*

WRITE TODAY FOR BULLETIN HI— 23—809



SIMONDS
ABRASIVE CO.

NUT INSERTED DISCS

for

VERSATILE GRINDING WITH ECONOMY

Maximum grinding contact! That's why Simonds Abrasive Company discs give fast, economical production. The side of the disc is used — grinds large areas quicker. Only usable abrasive charged for. Less machine wear — discs give better balance, reduced vibration and less overhang on shaft and bearings.

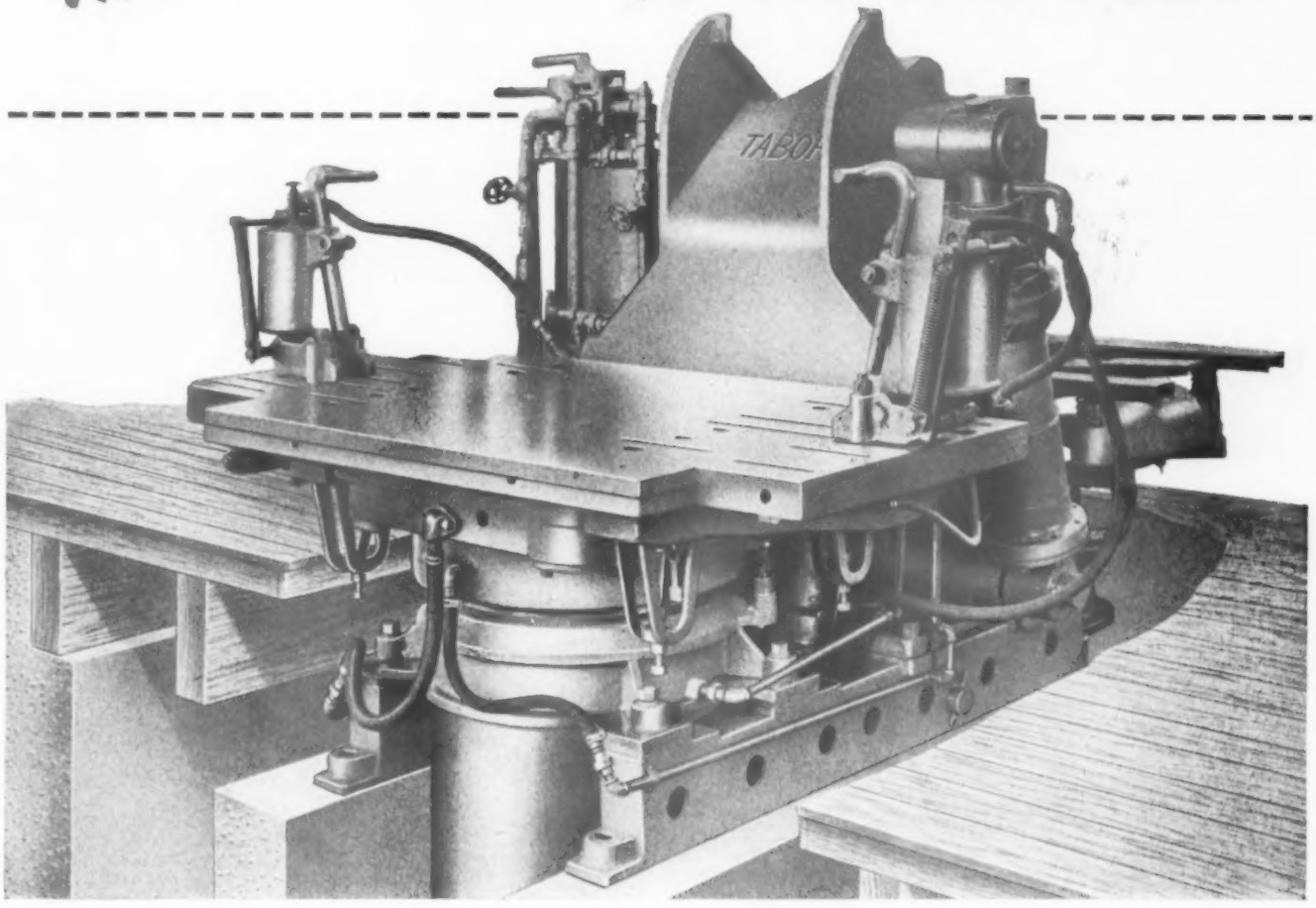
Use these versatile production tools on small parts or large areas up to 300 sq. ins. . . . for grinding metals, ceramics and other materials . . . for surfacing, sharpening, squaring, snagging.

Your Simonds distributor can supply you with discs specially made for Hanchett, Gardner, Besly and similar disc grinders. Let's send you his name together with details on grinding wheels for every purpose, and information on our full line of abrasive grains. Write.

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA., DISTRIBUTORS IN PRINCIPAL CITIES

DIVISION OF SIMONDS SAW AND STEEL CO., FITCHBURG, MASS. OTHER SIMONDS COMPANIES: SIMONDS STEEL MILLS, LOCKPORT, N.Y., SIMONDS CANADA SAW CO., LTD., MONTREAL, QUE. AND SIMONDS CANADA ABRASIVE CO., LTD., ARVIDA, QUE.

There's A TABOR ROLLOVER TO FIT THE JOB!



PICTURED is only one of Tabor's large and diversified family of foundry-proved Rollovers. This one's a 3,000-lb. capacity, *shockless* job. The rollover plate is 40" wide x 50" long. When air-operated flask clamps are used (as shown), it handles pattern boards ranging in length from 24" to 56". Even with modest pit requirements, the plate is only 15" above floor level for easy workability. Accommodates a 43" deep flask (including pattern board and bottom boards)—minus the draw required. Maximum draw on the unit shown is 15". With modifications we can provide for a 55" flask depth on the basis outlined above, and a 20" draw.

Tabor Power Rollovers run the gamut of size and type. They range from 450-lb. to 3,000-lb. capacity. All are *completely* power-operated and can be furnished with air-operated flask clamps. You can choose between plain or shockless jar, and some types are portable. All incorporate Tabor's famous air-on-oil principle for a perfect draw. All perform up to full rated capacity, completing a cycle of operations in the fractional part of a minute.

Complete Rollover family is presented in Bulletin #494—just off press. Write for your copy. Then team up with Tabor for a quick and satisfactory solution to any Rollover problem.

REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; E. R. Frost Company, Inc., Minneapolis 14, Minn.; Harry H. Reich, Trussville, Ala.

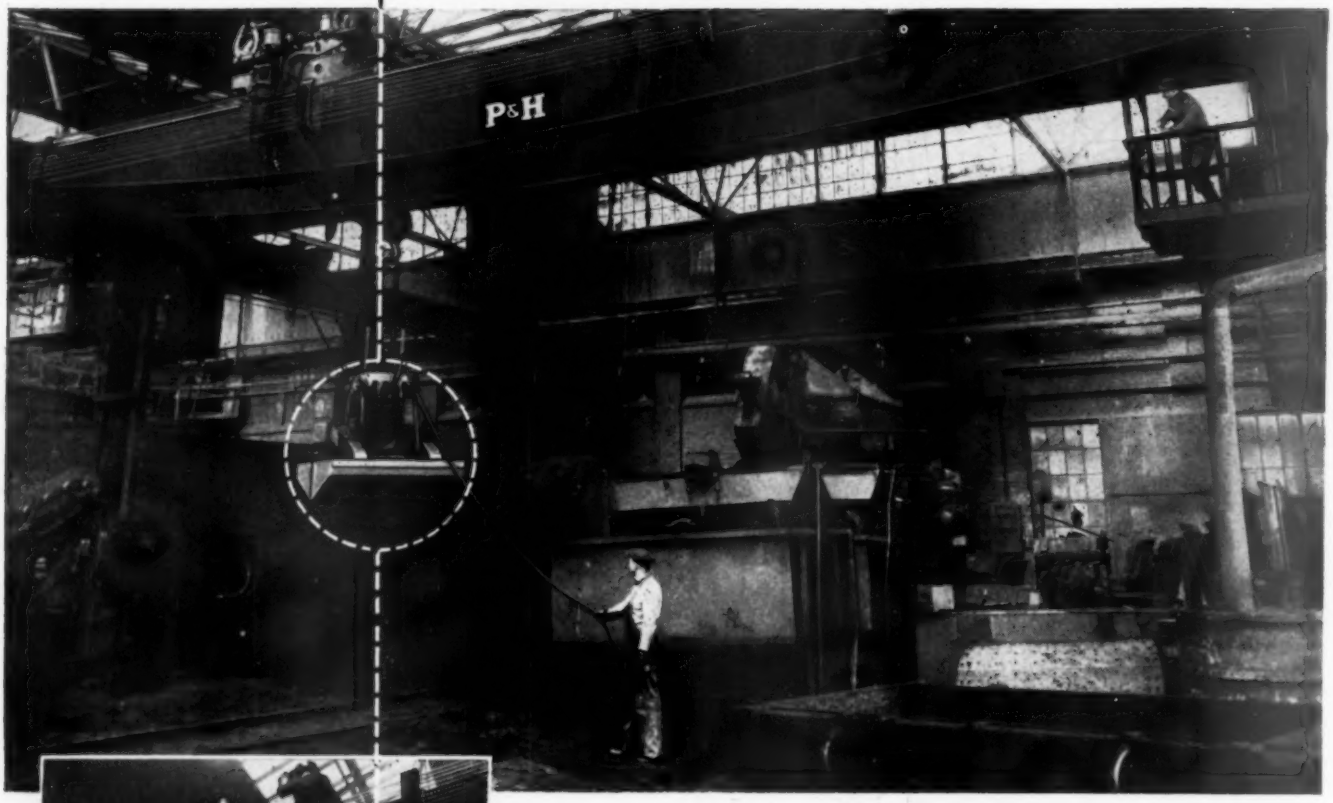
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

The TABOR Manufacturing Co.

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6225 TACONY STREET • PHILADELPHIA 35, PENNA.

EXPORT DEPARTMENT, 765 DREXEL BLDG., PHILA. 6, PA.

P&H SINGLE LINE GRAB BUCKETS



a "*Natural*" in foundry service!

In a matter of seconds you can attach the P&H Single Line Grab Bucket to your crane hook and it's ready to go to work. It's as simple as that — and it provides easy, accurate one-man operation. It works fast, bites deep, picks up clean.

Here's the fast, easy way to handle all kinds of bulk materials — sand, coke, crushed stone, cinders, etc. It's widely used to unload cars, dig pits, fill flasks, etc. A "natural" for foundry use if there ever was one.

Available in capacities from ½ to 2½ yds. Write for all the facts about it. Ask for Bulletin C-27.

P&H

GRAB BUCKETS
4405 West National Avenue
Milwaukee 14, Wis.

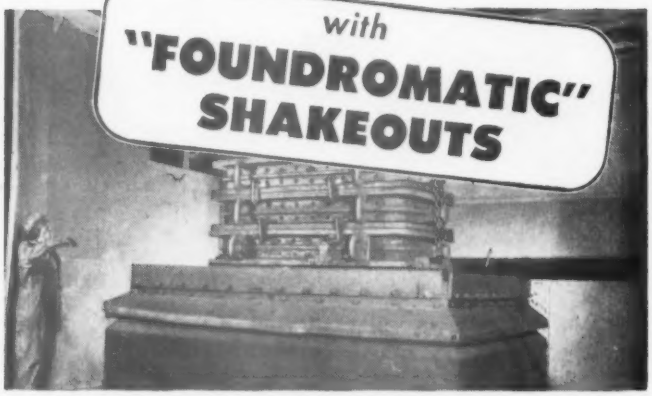
HARNISCHFEGER CORPORATION
ELECTRIC CRANES · EXCAVATORS · ARC WELDERS · P&H · HOISTS · WELDING ELECTRODES · MOTORS

LEADING FOUNDRIES GET

Bonus Production

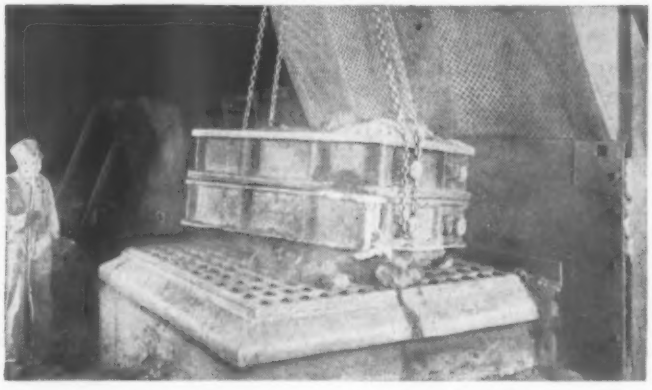
Two 8′ x 10′ Units in Parallel at Leading Cincinnati, Ohio, Foundry.

Floor capacity was increased when these two *Foundromatic* shakeouts were installed in parallel in this foundry. In one nine hour shift they average as high as 40 complete molds with mold weights up to 71,000 lbs!



8′ x 10′ Unit at Falk Corporation, Milwaukee, Wisconsin.

After five years of constant use, this shakeout still provides trouble-free service. This Allis-Chalmers shakeout has never been removed from foundation despite constant operation. Extremely low maintenance costs are reported by Falk company officials.



6′ x 8′ Unit at Bucyrus-Erie Co., South Milwaukee, Wis.

Shakeout runs 12 hours a day, six days a week, and averages between 15 and 20 tons of castings each day. This installation completely serves its purpose of speeding castings from the foundry floor to the machine shop.

4′ x 6′ Unit at Taylor-Wharton Iron & Steel Company, High Bridge, N. J.

This 5° slope shakeout receives sand and castings up to 300 lbs. from the discharge end of an apron conveyor. Sand spillage is minimized and casting cleaning performance is excellent.

YOU CAN GET SIMILAR EFFICIENCY with *Foundromatic* Shakeouts. The body is a one piece, welded, stress-relieved structure, essential for long mechanism life and reduced maintenance. Load on the shakeout is not limited by size of bearings or shaft — shaft is shorter and sturdier than in conventional units.

Your requirements can be met by one of the nine single-body shakeouts from 3′ x 5′ with capacity of one ton, to 8′ x 10′ with capacity of 25 tons. Multiple units can be supplied with capacities of 100 tons or larger.

Call your nearby A-C Sales Office for information, or write for new Bulletin 07B6365A.

A-3013

ALLIS-CHALMERS, 1032A SO. 70 ST. MILWAUKEE, WIS.

ALLIS-CHALMERS

Foundromatic and *Regulex* are Allis-Chalmers trademarks.

Foundry Equipment for Bigger Output-Better Working Conditions!

FEDERAL

for better, faster production...

SAN-BLO

The FIRST all-purpose sand blower...

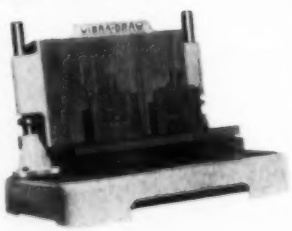
1. **Blows all kinds of core sand**
   dry core compound, oil sand or facing sand for green topping.
2. **Blows high strength sand**
   successfully blows sand of any green strength up to 8 lbs.
3. **Blows high moisture sand**
   successfully blows sand of any moisture content up to 8%
4. **Blows large and small cores**
   single cores up to 40 lbs. each, or 40 lbs. of small cores without refilling or moving blow head
5. **Blows all types of core boxes**
   open or closed, wood or metal—use your present equipment.

De luxe Model

CB-40D

Position core box and press valve—that's all you do with the Deluxe Model SAN-BLO. Self-adjusting table with 6" stroke permits blowing assortments of boxes with a 6" height range (such as 4" to 10", 6" to 12" etc.) CONTINUOUSLY—without adjustments or blow plate changes. And because blow head holds 40 lbs. of sand, there are fewer stops for re-filling. Cores are blown as fast as you can get boxes in and out! One half of core box can be fastened to blow plate and can be drawn, thereby eliminating one operation and speeding up production.

VIBRA-DRAW Core Drawing Machine



With any core blower, you make cores only as fast as you draw them. VIBRA-DRAW draws cores as fast as SAN-BLO makes them. Simply place core box against vibrating head and lift box—a perfect core every draw—and fast!

WHIRLMIX Sand Mixer

The first and only mixer with flexible, whirling, rubbing arms. Produces fluffy, aerated, thoroughly mixed sand without overheating, or crushing sand grains. Small, compact, easily-moved—yet a big producer, for it mixes 4,000 lbs. of sand per hour.

Federal Foundry Equipment

EQUIPMENT

Is production your problem, too? Then you should give serious thought to your equipment—for better equipment always means better, faster production. Check your machines carefully and replace those that are worn or obsolete with new and better models. For years, FEDERAL has been supplying the very best in foundry equipment, so when you're ready to modernize—check with FEDERAL first. For full information and prices on the items shown below, and others in the FEDERAL line, ask your local FEDERAL representative, or write direct.

CLIMAX WIRE STRAIGHTENER

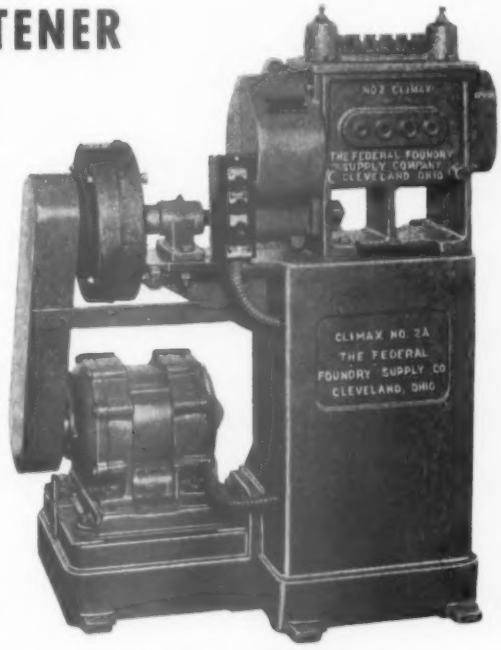
Now with wire hard to get, it's more important than ever before for foundries to straighten and re-use wires and rods. The CLIMAX Wire Straightener is the ideal machine for this important job.

1. Straightens random lengths of wires and rods
2. Can be operated efficiently by unskilled labor
3. Operation is safe, simple and fool-proof
4. A wide variety of models is available

Model 2 handles 4 wire sizes from 1/16" to 1/4". Model 2½, 4 sizes, from 3/16" to ½". Model 3, 5 sizes from 1/4" to 3/4". Each model can be furnished with (1) extended shaft for your own drive, (2) with speed reduction unit for your motor, or (3) completely motorized.

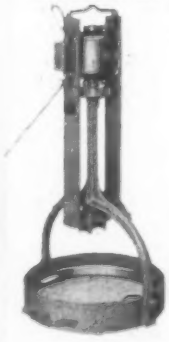
"An Old Friend"

The CLIMAX Wire Straightener has been an old friend in many foundries. Picture at left shows one of the models in use more than thirty years ago. CLIMAX machines have been improved and modernized to guarantee efficient operation.



Model 2A—Motorized

LOWE Electric Sifter



The LOWE Electric Sifter features greater screening area, enclosed ball bearing motor, more shoveling room, rugged construction and trouble-free operation. It will save time and money for you, through faster sifting and better sand conditioning. Write for descriptive circular and prices.

SHUR-SPOT Sprues

For use on squeezer-made molds. SHUR-SPOT squeezes down with the sand. When squeezer board is removed, SHUR-SPOT pops up to be lifted out. The result is a fully completed and properly located pouring sprue, requiring no finishing. Write for complete information and prices.

THE FEDERAL FOUNDRY SUPPLY COMPANY

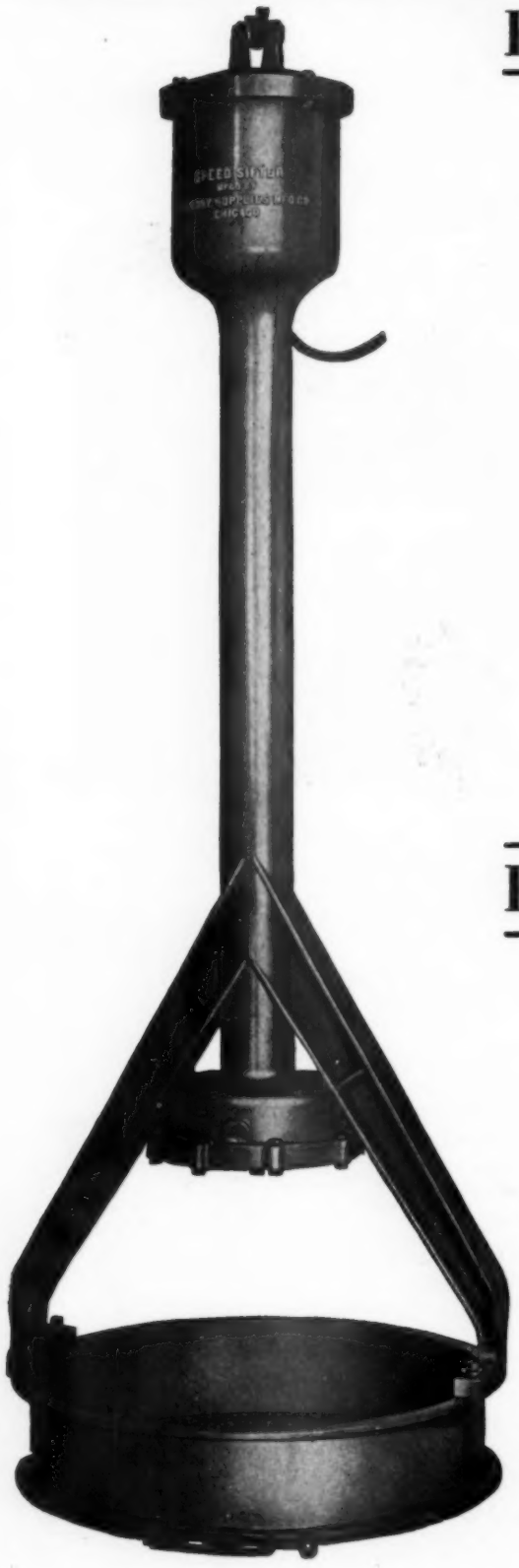
4600 East 71st Street • Cleveland 5, Ohio

Sales Offices: CHICAGO • DETROIT • MILWAUKEE • NEW YORK • CHATTANOOGA • RICHMOND, VA. • LOS ANGELES

Increase Production

with the

ROTOPLANE SPEED SIFTER ★ RED ELECTRIC VIBRATORS



ROTOPLANE SPEED SIFTER

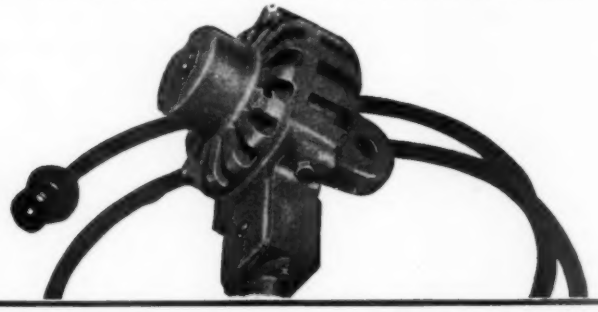
The ROTOPLANE Speed Sifter is an *improved* sand riddle of much greater capacity and much longer life. One size and type serves all purposes in the foundry—does *all* your sifting more quickly and economically.

It is easily handled by one man, weighs approx. 90 lbs. is 62 in. high overall. The one-piece frame of tough aluminum alloy makes for a remarkably effective vibration. Its smooth, free, rotary action vastly increases bearing life; all bearings grease packed. All mechanism of the ROTOPLANE is *completely* enclosed—no bearings or activating parts of any kind exposed to dust and grit.

The Quick-Change Sieves are instantly interchangeable, mounted in smooth, flat steel ferrule, with 20-inch diameter clear sifting area. No jagged edges to tear workers' hands, no storage problem.

$270.00 f.o.b. Chicago—complete with cable, safety ground wire. Standard 1/3 h. p. motor, 110 volt, 60 cycle, single phase and 220 volt, 1 or 3 phase.

UNIVERSAL FREE - WHEELING RIDDLE equipped with motor as above $245.00



RED ELECTRIC VIBRATORS

True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

(All Prices f.o.b. Chicago)

No. 1—Light match plate work	**$11.00**
No. 2—Medium match plate work	**13.00**
No. 5—Heavy match plate, tub and bench work	**17.00**
No. 9—Machine and heavier work	**26.80**

Third (ground) wire per U. S. Govt. code—furnished with No. 9 at no extra cost; $1.20 extra with Nos. 1, 2 and 5 vibrators.

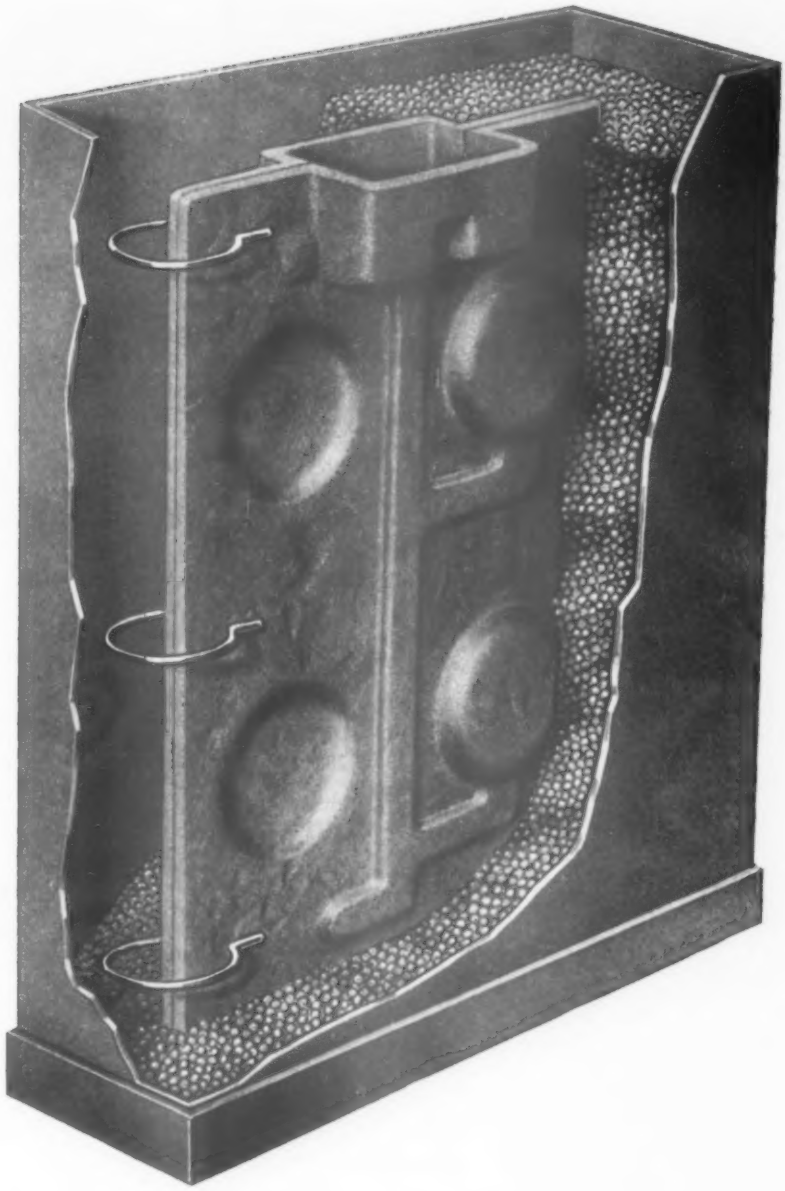
KNEE SWITCHES for operating Red Electric Vibrators: Single pole $5.00, Double pole $6.50.

FOUNDRY SUPPLIES MANUFACTURING CO.

2221 Orchard Street **Chicago, Illinois**

CABLE ADDRESS: "ROTOPLANE CHICAGO"

Could You Make This Sand Mold in 6 Minutes?



USING BAKELITE PHENOLIC RESIN as the binder, sand molds like this one were turned out repeatedly by the "Croning" Process in just six minutes each—at a demonstration before hundreds of foundrymen at the 1950 Foundry Show in Cleveland.

Today the "Croning" Process for making foundry sand molds and cores is opening the eyes of foundrymen everywhere to new economies, better castings, and greater profit opportunities.

Principal advantages of the process are:

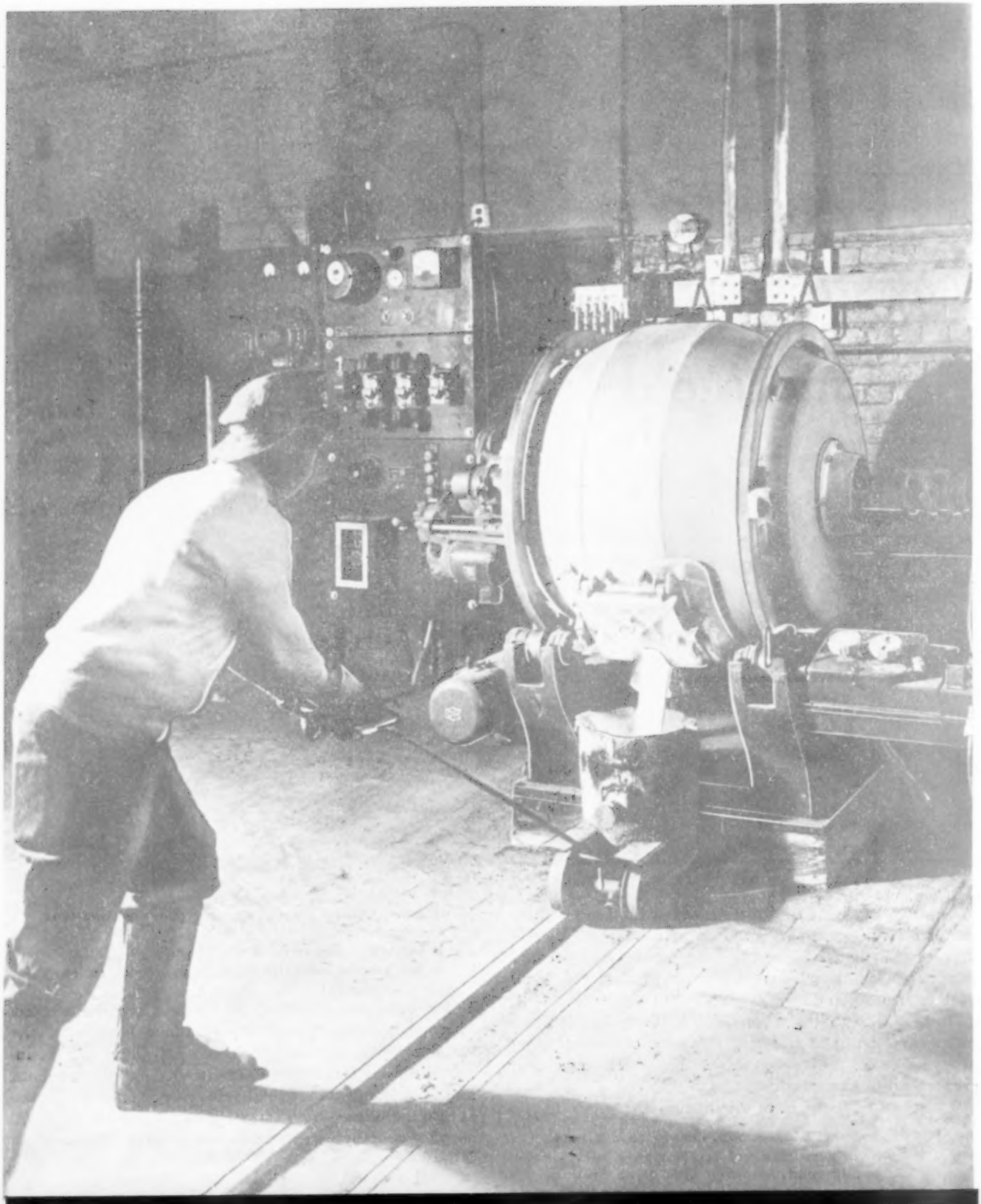
- **Pieces are cast closer to size, thereby saving metal.**
- **Smooth surfaces obtained are free from burnt-on and burnt-in sand, requiring little or no finishing such as shot-blasting or other types of abrading.**
- **Tolerances of .002 to .003 of an inch—usually only a finish cut required instead of a rough cut followed by a finish cut.**
- **Long baking and curing are not required, and there is less tie-up of equipment, providing increased productivity.**
- **Molds and cores are only thin shells as contrasted with solid cores and molds for conventional sand casting, which gives great savings in sand and sand preparation.**
- **Extremely thin sections can be cast.**
- **The process lends itself readily to mechanization.**

If you have not already sent for your free, illustrated, 16-page booklet, "BAKELITE Phenolic Resins for the 'Croning' Process," send for it today. It gives specific information on BAKELITE Resin binders, wetting agents, and parting agents especially developed for the process. It also includes data on types of sands required, as well as pattern preparation and core making. Write Dept. BA-29 for your copy.

Bakelite Phenolic BONDING RESINS

BAKELITE DIVISION UCC

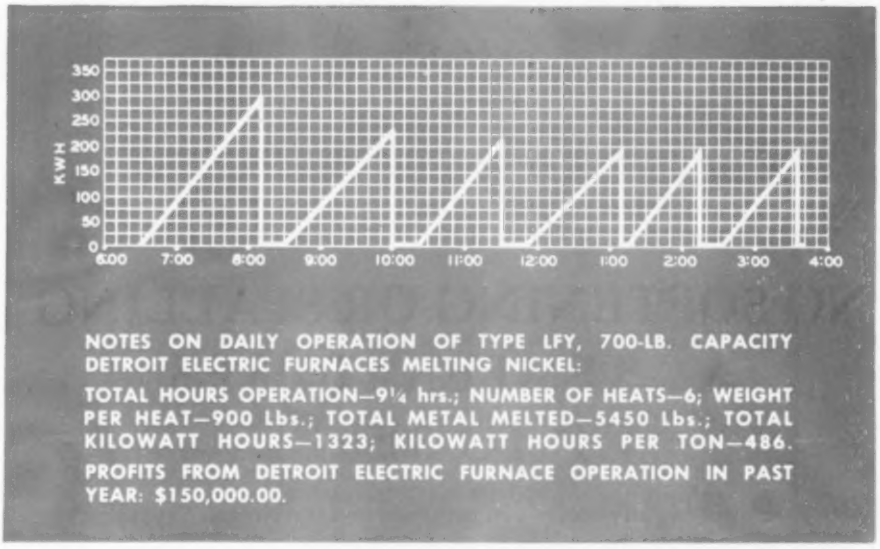
BAKELITE DIVISION, *Union Carbide and Carbon Corporation,* 30 East 42nd Street, New York 17, N.Y.



Low MELTING COST *High* QUALITY CONTROL
FOR FERROUS *and* NON-FERROUS METALS

$150,000 PROFITS

FROM ONE YEAR OF DETROIT ROCKING ELECTRIC FURNACE OPERATION



NOTES ON DAILY OPERATION OF TYPE LFY, 700-LB. CAPACITY DETROIT ELECTRIC FURNACES MELTING NICKEL:

TOTAL HOURS OPERATION—9¼ hrs.; NUMBER OF HEATS—6; WEIGHT PER HEAT—900 Lbs.; TOTAL METAL MELTED—5450 Lbs.; TOTAL KILOWATT HOURS—1323; KILOWATT HOURS PER TON—486.

PROFITS FROM DETROIT ELECTRIC FURNACE OPERATION IN PAST YEAR: $150,000.00.

A large automotive plant did it! Actually racked up $150,000 profits on Detroit Rocking Electric Furnaces in a year's operation.

The same operating advantages that set this outstanding record will work for you, too, when you put Detroit Rocking Electric Furnaces on your metal melting operations.

What Rocking Does

The rocking action of Detroit Electric Furnaces contributes heavily to superior performance. Electrodes remain clear of the molten bath at all times, eliminating the possibility of carbon pickup. The rocking movement stirs the bath constantly and assures complete homogeneity of the melt. It aids efficiency, too, because the metal picks up additional heat as it washes over the refractory lining.

Profit-Producers

More heats per day because of faster melting speed, easier handling, positive control, minimum out-of-production time.

Maximum uniformity of product assures better quality of castings, higher usable yield per melt, fewer rejected castings.

Detroit Rocking Electric Furnaces achieve lowest metal loss by shrinkage, convert shop borings and turnings with least loss from oxidation.

Optimum power use makes for melting economy, and all-electric operation cancels the need for costly handling and storage of bulky fuels.

Full Range of Capacities

Detroit Electric Furnaces are available in capacities from 10 to 4000 lbs with either conical or cylindrical chambers. Furnaces are individually designed to meet your plant electrical specifications.

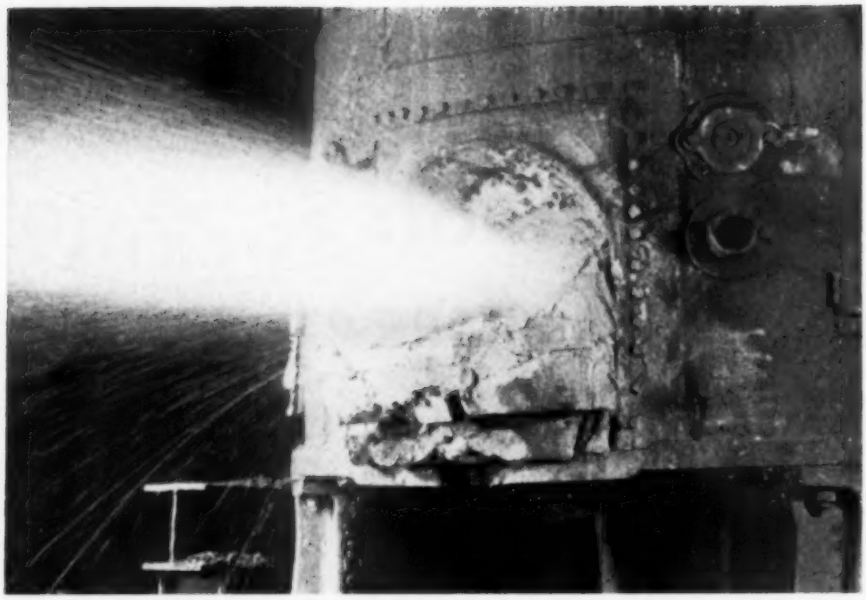
Get the Facts!

If you melt ferrous or non-ferrous metals, get the details on Detroit Rocking Electric Furnaces. Send us your production data and our engineers will furnish facts on high operating economy, positive quality control and other advantages for you in the Detroit Rocking Electric Furnace suited to your needs. Write to

DETROIT ELECTRIC FURNACE DIVISION

KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN

Foreign Representatives: In BRAZIL—Equipamentos Industrias "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Casco, S. de R. L. Atenas 32, Despacho 14, Mexico City, D. F.



SLAG HOLE BLOCKS LAST LONGER when made of Norton Crystolon* Refractory because the more dense bonded silicon carbide grain resists slag action either by corrosion or erosion.

NO SOFTENING OR SPALLING AT TEMPERATURES UP TO 3050°F!

That's one big advantage you get when you use Norton Crystolon* slag hole blocks in your back-slagging cupolas. Made of densely bonded, chemically inert silicon carbide grain, they resist the corrosion, erosion and penetration of slag 5 to 15 times longer than fire clay blocks.

Give yourself this *extra* assurance of getting all the way through your campaign without stopping to replace your slag hole block.

Compare!

Yes, compare Norton Crystolon slag hole blocks with whatever you're now using. Chances are you, too, will get longer runs before replacement. For prices or more information, contact your nearby Norton representative or write us direct. NORTON COMPANY, WORCESTER 6, MASS.

NORTON

TRADE MARK REG. U. S. PAT. OFF.

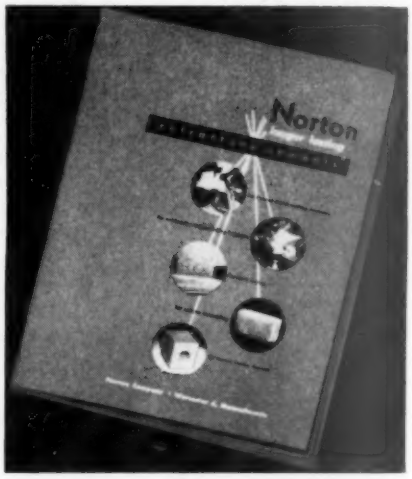
Making better products to make other products better

Special REFRACTORIES

Canadian Representative

A. P. GREEN FIRE BRICK CO., Ltd. TORONTO, ONTARIO

Up-To-The-Minute Facts About Refractory Cements



"The most helpful bulletin on refractory cements ever published"

That's the opinion of the foundry and furnace men who have read this new Norton bulletin. Compiled after exhaustive laboratory and field tests by Norton refractory engineers, this bulletin covers the entire subject of Norton cements with charts, drawings and detailed instructions.

Selection charts

If this bulletin contained nothing but its two selection charts, it would be well worth sending for. At a glance, you know the right cement for various metal-melting furnaces, for brick laying, for resistor imbedding, for burner blocks and tunnels.

"How To" Instructions

Other subjects covered by this booklet include correct preparation, proper installation, drying and maturing . . . all the do's and don'ts that add up to longer-lasting cement applications.

Write for bulletin 863

NORTON COMPANY

301 NEW BOND STREET

WORCESTER 6, MASS.

* Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

Model CH-20 Truscon Power Handled Flask.

Model CH-40 Truscon Flask for Extra Heavy Duty.

HEADQUARTERS
FOR STEEL FOUNDRY FLASKS

THE SUCCESS of modern foundry methods depends upon the speed and economy with which molding operations can be handled.

Truscon's Pressed Steel Division—nationally known for the quality of its products and the dependability of its service—is fully equipped and prepared to handle your foundry flask requirements. The Pressed Steel Division's central location assures efficient service for your needs. Write for free catalog describing the complete line of Truscon Steel Foundry Flasks.

TRUSCON
STEEL COMPANY
PRESSED STEEL DIVISION
6100 TRUSCON AVE. • CLEVELAND 4, OHIO
Subsidiary of Republic Steel Corporation

Model OM-1 Truscon Flask for One-Man Handling.

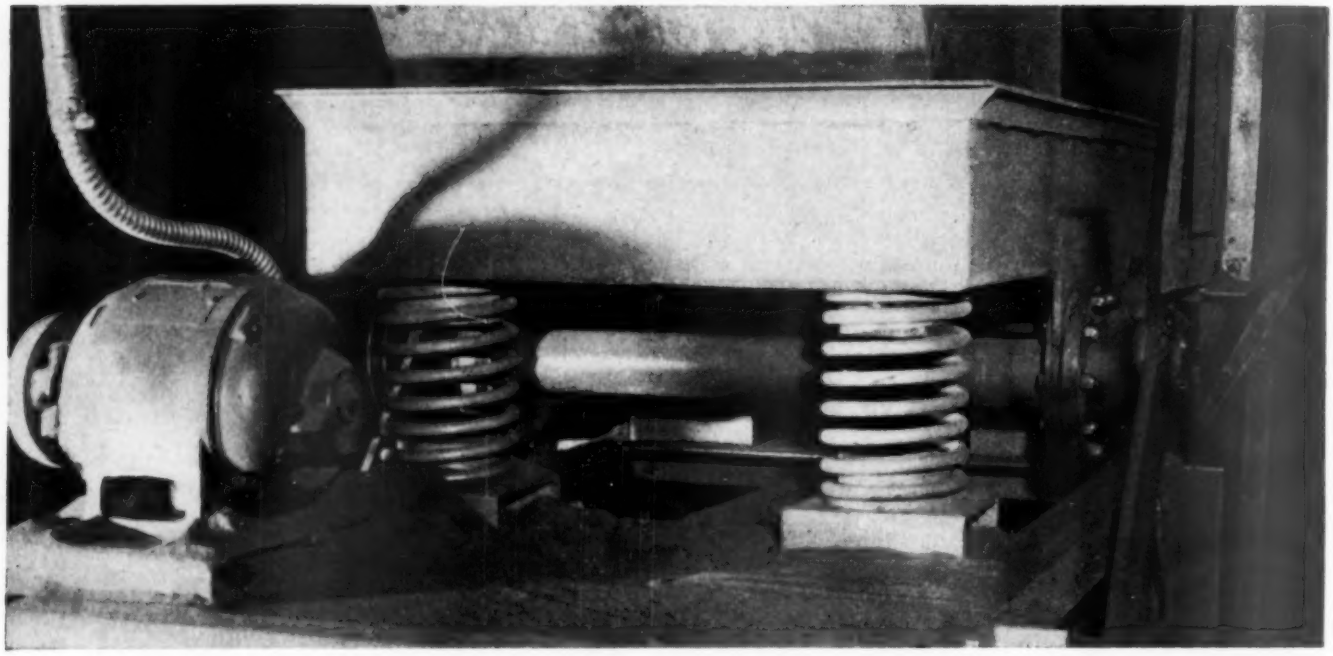
Model OM-4 Truscon Flask for One-Man Handling.

Model TMR-60 Round Truscon Steel Flask for Two-Man Handling.

Model TM-10 Truscon Flask for Two-Man Handling.

Model TM-12 Truscon Flask for Two-Man Handling.

HEWITT-ROBINS PRESENTS THE Vibra-Feeder®



The First Simple, Practical, Low-Cost Fully Mechanical Vibrating Feeder

Finally . . . a practical vibrating feeder that is *fully mechanical!* The new Hewitt-Robins Vibra-Feeder performs as well or better than the most expensive feeders, yet *its only electrical is a light-duty plug and receptacle,* and its current draw is as little as *2 amperes!*

Just look at all the ways the Vibra-Feeder saves you money, not only in initial cost but in installation, operation, maintenance and replacement parts:

No Extras—Initial cost covers *everything you need* for complete installation, including motor, V-belts, sheaves, cable and all other accessories.

Easy to Install—Your own maintenance personnel simply bolt the Vibra-Feeder to whatever base you have available—or suspend it wherever desired. Hook the motor to the line and it's ready to go to work!

Easy to Operate—Just push a button and start loading. The Vibra-Feeder *cannot be overloaded* because it's fully mechanical . . . *will not bog down . . . will feed consistently under any load!* Once set for your particular load, you can forget about it.

Low-Cost Replacement Parts—The only moving parts are in the vibrator itself. They're simple in form, low in cost, easily serviced by your maintenance crew. And remember, no costly control boxes, tubes, motor generators, etc. to repair or replace!

Negligible Maintenance—Only two points to lubricate—both on the vibrating mechanism. What little maintenance there is, can easily be done by your own shop personnel.

Fully Mechanical Vibrator—Very simple in construction . . . just four bearings and an eccentric shaft. Vibrator is fully mechanical, completely dust-tight, impervious to heat and cold, practically noiseless!

Wide Range of Sizes—Available from 24" to 43" wide and 48" to 96" long, with other sizes to meet your precise specifications.

The Vibra-Feeder is another Hewitt-Robins "first" in the materials handling field . . . another example of the way Hewitt-Robins can save you time, trouble and money, no matter what you have to move. For complete details, write for Bulletin 134, Robins Conveyors Division, Passaic, New Jersey.

A MECHANIZED FOUNDRY BENEFITS EVERYONE

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

HEWITT-ROBINS

VIBRA-FEEDER

HEWITT-ROBINS HR **INCORPORATED**

BELT CONVEYORS (*belting and machinery*) • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLOKT ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

Bulletin on SUPER REFRACTORIES

by CARBORUNDUM

TRADE MARK

NO. 11 NOVEMBER, 1950

Why is a Variety of Super Refractories Desirable?

A wide range of refractory properties is required in modern furnaces. Resistance to slags, spalling, cracking, mechanical abrasion, flame erosion, and high temperatures are needed. Chemical inertness, load carrying ability and high thermal conductivity are also called for. Light weight, high density, low permeability and insulating qualities are often required.

Obviously, no single super refractory can embrace all of these features. Therefore, a variety is needed in order to provide the best possible combination of features for each particular set of operating conditions.

The table below indicates only the major classes of super refractories by CARBORUNDUM. Each product class must necessarily consist in turn of many *types*. A silicon carbide refractory, for instance, may be the proper material for a job providing that certain of its properties can be enhanced. To best meet such requirements, a special *type* of CARBOFRAX silicon carbide refractory must be available.

In order to meet this wide range of demands The Carborundum Company has developed a large variety of super refractories. Today, more than 60 standard types of CARBOFRAX materials are available. Other product groups have been extended proportionally.

Physical Properties of Super Refractories by CARBORUNDUM

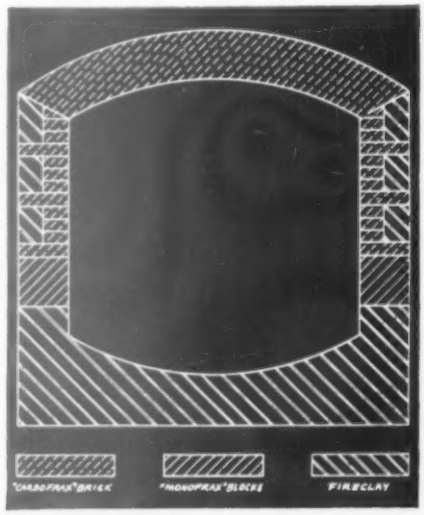
Trade Mark

	CARBOFRAX Silicon Carbide	MULLFRAX Electric Furnace Mullite	MULLFRAX S Converted Kyanite	ALFRAX K Electrically Fused Alumina	ALFRAX B Electrically Fused Alumina	ALFRAX BI Electrically Fused Alumina
Heat Conductivity at 2200° F. in BTU/ hr. sq. ft. and °F. /in. of thickness	109 BTU	16 BTU	9 BTU	24 BTU	12 BTU	7 BTU
REFRACTORINESS PCE CONE	37-40	38-39	37-38	37-39	39-40	38-39
SPALLING RESISTANCE	High	High	High	Good	Good	Good
ABRASION RESISTANCE	High	Medium	Medium	High	Medium	Low
THERMAL EXPANSION (25° — 1400° C.)	.0000044	.0000059	.0000069	.0000074	.0000086	.0000086
MODULUS OF RUPTURE @ 2460° F. PSI	800-3125	100-250	175-475	100-1050	100-225	50-100
WEIGHT 9 IN. STRAIGHT	9.25 lbs.	9 lbs.	8 lbs.	10.1 lbs.	7.25 lbs.	4.8 lbs.

Twin Problems Here — Abrasion and Heat

It used to be necessary to patch the side walls of these coke fired forge heating furnaces every day and rebuild brickwork every two to three days. Used for heating caps to be welded on drilling bars, the sidewalls were subjected to 2700°-2800° F. along with considerable abrasion as parts hit the walls. However, since the installation of eight courses of CARBOFRAX silicon carbide brick in each side wall, patching is necessary now only once a month and rebuilding only after three to four months of continuous operation.

The right combination of properties of the CARBOFRAX brick used have best fulfilled these service requirements.



Two Types of Super Refractories Best Service Reverbatory Furnace

This is a cross-sectional view of a typical reverberatory type, rock wool furnace using super refractories by CARBORUNDUM to advantage.

To withstand the extreme corrosion encountered at the slag line, MONOFRAX K fused cast blocks are used in

"Carborundum," "Carbofrax," "Mullfrax," "Monofrax," "Alfrax" are registered trademarks which indicate manufacture by The Carborundum Company

Address all correspondence to: Dept. A-110, THE CARBORUNDUM COMPANY, Refractories Division, Perth Amboy, New Jersey

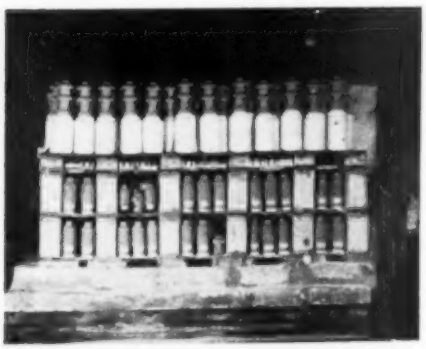
Continued on other side →

← Continued from other side

this area. Being a fused cast high alumina product, this material is extremely dense, thus avoiding erosion by the basic charge. It is also highly refractory, having a fusion point of over 3500° F.

Above the MONOFRAX blocks, CARBOFRAX brick are used in the side walls and arch to withstand the extreme temperatures and cutting action of the flame. As there is no softening of the hard, dense CARBOFRAX brick, deformation of the walls is avoided — maintenance cost is minimized. Also, the high thermal conductivity of these brick is used to dissipate heat in certain areas.

As is apparent here, complex service conditions — even in one furnace — often demand a combination of super refractories to meet these needs.

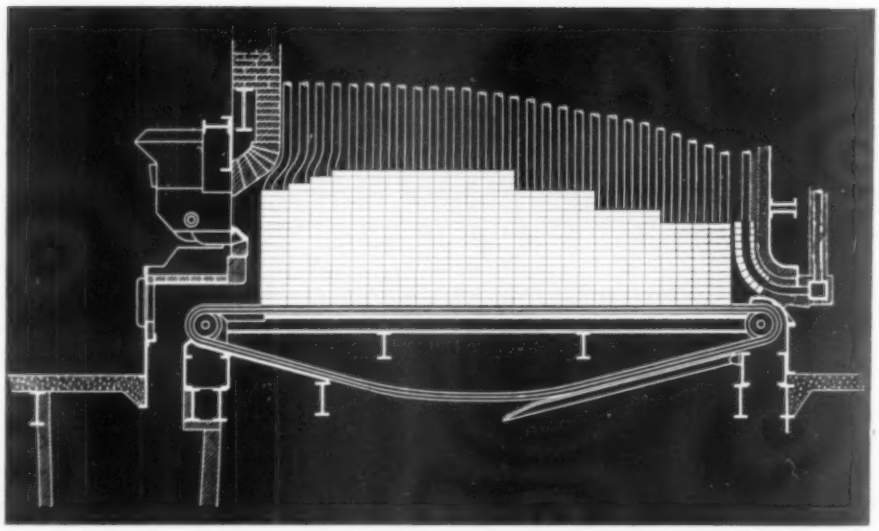


Ceramic Operation Demands Special Type Super Refractory

This is a typical car superstructure used by a manufacturer of electrical porcelains and insulators. The kiln is operated on a 48 hr. cycle at temperatures up to 2240° F. Due to the kiln construction, the furniture is subjected to severe heat shock at the entrance. Yet at the time of this picture, the CARBOFRAX setter tile had averaged 150 trips and were still in use. Moreover, in a 10 month operating period only two cars had to be rebuilt.

This excellent performance is attributed to the use of a special variety of CARBOFRAX tile. They have exceptional resistance to heat shock and can carry heavy loads at high temperatures. (Note that the tile are still straight and true.) Also, the high thermal conductivity of the thin section CARBOFRAX tile insures uniform burning of the ware, and reduces under- and over-firing losses. Ware sticking is avoided, too, since these tile remain free from boiling or blistering.

Regardless of the type of ceramic operation there is a super refractory by CARBORUNDUM with the right combination of special properties to give the most economic results.



Job-Designed Super Refractory Aids Boiler Operation

Illustrated is a typical spreader stoker fired boiler equipped with water walls and a traveling grate. The water tubes are faced with CARBOFRAX silicon carbide blocks.

Here are the several advantages of using CARBOFRAX blocks: they protect the tubes from the abrasive action of the fuel and clinkers on the traveling grate; they protect the tubes from fuel impingement; they prevent slag from forming between the tubes and hampering operations; and they conduct the heat rapidly from the firebox to the water tubes. These operating benefits result from the specialized properties of CARBOFRAX blocks developed particularly for this type of service.

4 Different Super Refractories Improve Enameling Furnace Operation

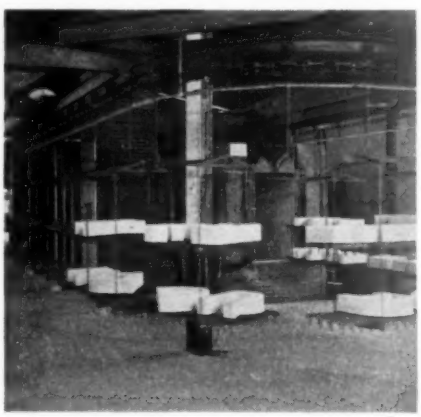
To meet all of the conditions found in the various zones of this continuous enameling furnace, four types of super refractory are needed.

The side walls and hearth of the muffle are made of two varieties of CARBOFRAX silicon carbide tile. The lower thermal gradients through the muffle tile reduce the temperature heads. Thus, working temperatures are attained with less fuel input. With the greater temperature uniformity there are fewer rejects.

The support arches and pier facings are made from MULLFRAX electric furnace mullite material to best meet service conditions in the combustion chamber.

ALFRAX aluminum oxide side rail tile are used to support the muffle side walls. These tile are chemically inert and have more than enough strength to carry the side wall load.

By proper combination of these super refractories, the operator of this furnace has increased production and decreased fuel and maintenance costs. These exceptional results are made possible through a wide variety of super refractories by CARBORUNDUM from which to select.



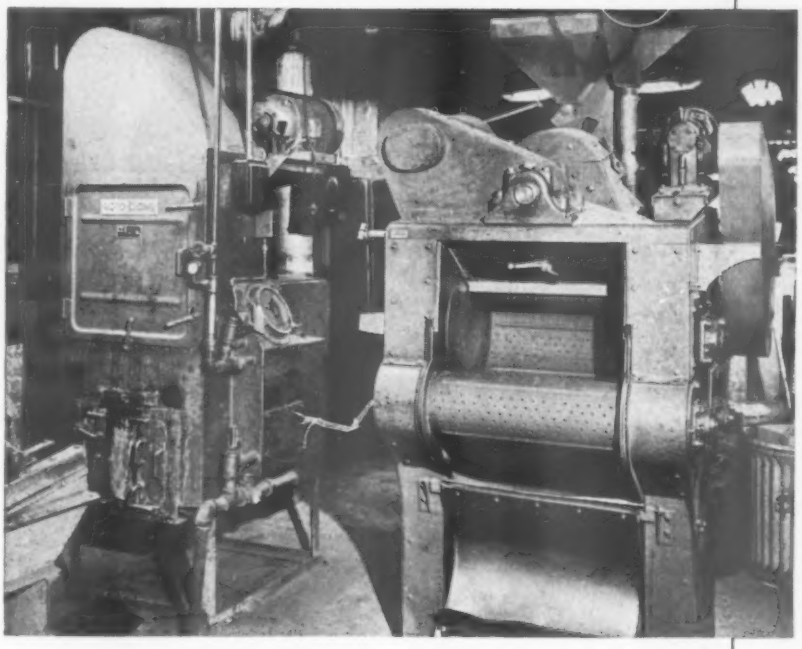
To obtain facts and figures on installations in specific fields merely select from this list of bulletins. Copies will be sent you at once. No obligation, of course.

Super Refractories by CARBORUNDUM (general catalog)
Super Refractories for the Ceramic Industry
Super Refractories for the Process Industry
Super Refractories for Boiler Furnaces
Super Refractories for Heat Treatment Furnaces
Super Refractories for Gas Generators
The Frax Line of Cements
CARBOFRAX Refractory Skid Rails
Porous Media for Filtration & Diffusion

Dept. No. A-110

THE CARBORUNDUM COMPANY
Refractories Division
PERTH AMBOY, NEW JERSEY

Here's the source and solution of a dust problem side by side



• This illustration gives proof to the statement, "There's always room for a Roto-Clone". At right, you see an abrasive cleaner which is a high volume dust producer. At left, you see a Type N Roto-Clone* which serves this unit. And the one thing you don't see is dust.

Like all Roto-Clones, compact, space-saving design is a feature of the Type N unit. And it's death on dust! This Hydro-Static Precipitator delivers high efficiency dust separation and collection by a combination of centrifugal force and thorough scrubbing of the air by a water curtain. Exhausting a constant air volume assures effective dust control at all times. There are no secondary dust problems as the Type N discharges the collected material as a sludge for easy disposal.

Don't penalize the efficiency of your operation through lack of proper dust control. It's simple and sure the Roto-Clone way. There's a type and size for every job that can be fitted into your present setup quickly and easily. For complete information, call your local AAF representative or write direct to

AMERICAN AIR FILTER COMPANY, INC.
266 Central Avenue, Louisville 8, Ky.
In Canada: Darling Bros., Ltd., Montreal, P. Q.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

**Roto-Clone is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*

AAF

ROTO-CLONE®
DUST CONTROL EQUIPMENT

CONE WHEEL SMOOTHS OUT DIE MARKS 200% FASTER

IN grinding die marks from the inside of pressure tanks, this manufacturer was using straight type 4500 R.P.M. grinders with 6″ x 2″ x ⅛″ vitrified wheels. The wheels cut grooves into the tank on either side of the die marks, causing failures under test.

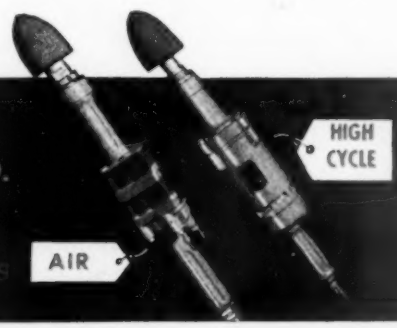
When called in, the Rotor Application Engineer recommended 8500 R.P.M. Rotor Air Grinders with 2¼″ x 3½″ x ⅛″ resinoid bond cone wheel, round nose. Result:

Output increased 200% because the round nose cone wheel could be held on the die marks without cutting into the tank wall . . . and because of the faster cutting of the resinoid wheel and the higher speed.

Now the inspector says, "OK," every time.

How about *your* portable tool problems? We'd like to tackle them!

AIR O'TOOL



THE ROTOR TOOL CO.
CLEVELAND, OHIO
UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

LINDE'S News of Metalworking

$$$$$$ Saved in Removal of Blast-Furnace Salamander

Oxy-acetylene powder-cutting eliminated a nasty job in one steel mill not long ago. The problem was to remove a salamander in a blast furnace so that the hearth could be replaced without disturbing the upper lining.

After discussing the problem with a LINDE Process Service representative, the company decided to use powder-cutting with an OXWELD C-60 Blowpipe to cut up the salamander.

Only three days were required for the cutting. Production time saved over any other removal method was estimated to be two weeks. $500,000 worth of iron can be produced in two weeks' time.

Most important from the mill's standpoint was the fact that the upper brickwork was not damaged. Damage from other methods of removing the salamander could run as high as $300,000 worth of brickwork.

The OXWELD C-60 Blowpipe is specially designed for extra heavy cutting. And when powder-cutting is used refractory oxides are no problem.

What's News

► Of special interest to quarry men is LINDE'S Jet-Piercing blowpipe which can pierce holes to a depth of 5 ft. in hard and abrasive rocks and ores. This economical, speedy method makes blast holes in granite at a rate of 22 to 25 ft. per hour.

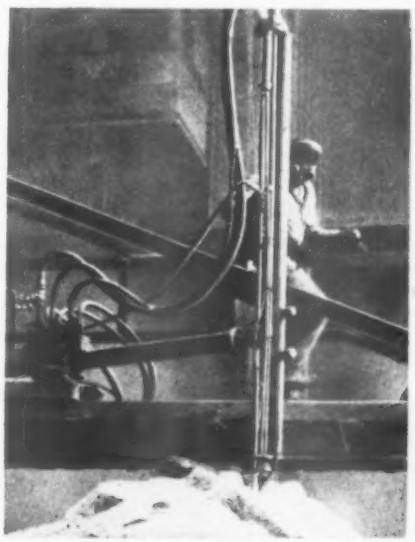
► One pipe manufacturer has produced a record seventy miles of 24-in. pipe (12,990 tons) in one month with the help of UNIONMELT welding.

► By using oxy-acetylene flame-cleaning, a foundry has cut the time required to clean slag from the center of their 20-in. castings from about 6 hours to 5 minutes.

► When television inspectors rejected ten thousand tubes because of cracks in the spun chrome steel bases, LINDE engineers showed the tube manufacturer how to make repairs by HELIARC welding. A saving of $8.00 per tube was accomplished.

LINDE Service Doesn't Cost -- It Pays!

THE LINDE AIR PRODUCTS COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: DOMINION OXYGEN COMPANY, LIMITED, Toronto



Powder-cutting is used for many jobs in addition to the salamander cutting described above. It is ideal for reducing large masses of cast iron.

"Lost Heat" Reclaimed in 18 Hours

When a full 75-ton heat of steel was recently lost through the bottom of an open-hearth furnace, it was reclaimed in only 18 hours. An OXWELD C-60 Cutting Blowpipe quickly cut the metal to handling size. Using older methods this would have been a three-day task.

Two full days of operating time were saved by returning the furnace to service in 18 hours. Actual cutting time was only five hours.

And the expense? Total cost for materials amounted to not more than $100.

For further information about powder-cutting or other LINDE processes, call or write our nearest office. We'll be glad to give you more details.

Slag and cinder inclusions are no problem for the C-60 and powder-cutting. Spill sections as thick as 6 ft. have been severed by continuous cutting.

The terms "Linde," "Oxweld," "Unionmelt," and "Heliarc" are registered trade-marks of Union Carbide and Carbon Corporation or its Units.

for FLOOR STANDS

for SWING FRAMES

for PORTABLES

Making better products to make other products better

Wouldn't You Like a Wheel with *the* Combination of

Cutting Action and *Wheel Life*

that means *MAXIMUM ECONOMY* for you on each of your Rough Grinding Jobs?

NO matter what combination of cutting action and length of wheel life you require for maximum economy on *your* particular snagging jobs, Norton Company, with its research facilities, engineering skill and wide product variety, can fill your requirements.

FAST CUT

If "fast cut" is the primary requirement which spells economy on your snagging operations, you'll find a Norton wheel with exactly the right abrasive and bond combination to fill the bill.

LONG LIFE

If "long life" is your particular requirement for economy, Norton abrasive know-how can help you to select exactly the right grinding wheels.

PRODUCT VARIETY

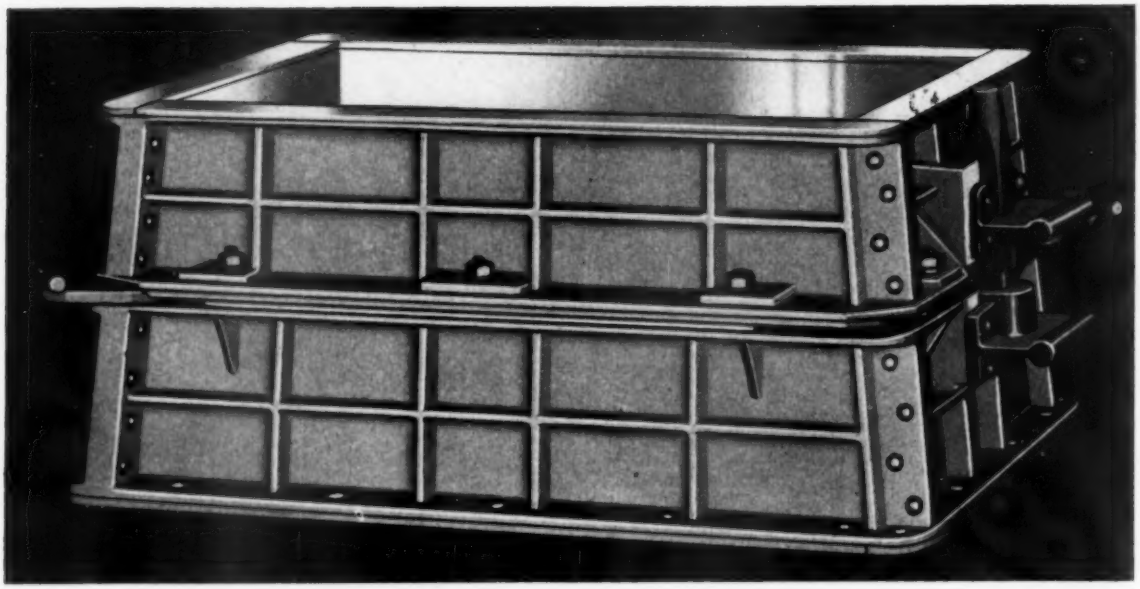
Norton wheels for snagging operations are available with ALUNDUM, 15 ALUNDUM, 57 ALUNDUM and CRYSTOLON abrasives; with B-5, B-7 and BH resinoid bonds and vitrified bond.

You'll find many helpful rough grinding tips and scores of cost-cutting wheel specifications in the Norton booklet, "Rough Grinding." Send for your copy of Form 1405-A1.

NORTON ABRASIVES

NORTON COMPANY, WORCESTER 6, MASS. · Warehouses in Five Cities · Distributors in All Principal Cities

W-1324



Flask Equipped with ¾" Square Pins.
Several Types Of Pins To Choose From

50%

Increase in production is reported by a large midwest producer of Lawn mower castings, after installing "Diamond Featherweight magnesium flasks".

50% more molds per floor with less fatigue to the molder was attained.

Strong and light in weight, The Diamond Featherweight is the fastest and easiest operated flask on the market.

Fast operating sand strip releases flask with ease from the mold.

No clogging with sand, and no sand hanging in the corners.

The ideal production flask for all foundries.

We also manufacture a complete line of Wood Flasks, both snap and slip. Steel and Aluminum Jackets, steel and aluminum core plates, steel and aluminum bottom boards.

DIAMOND

Telephone 2-2553 **CLAMP AND FLASK COMPANY** Richmond, Indiana

Designers of **CORE PLATES, JACKETS, BANDS, FLASKS** *since 1889*

HERE'S HOW WE KNOW

Malleabrasive® *

(SHOT and GRIT)

cuts blast cleaning costs 50%

. . . say leading foundrymen everywhere.

ACCURATE TESTS conducted in foundries from coast to coast prove that Malleabrasive cuts blast cleaning costs in half time after time. These records show how foundries save up to $4000 per machine every year just by using Malleabrasive.

THE REPORTS—on file at Pangborn—show exactly where Malleabrasive saves money and how much it saves. They prove that Malleabrasive lasts 2 to 4 times as long as ordinary chilled shot or grit, wearing parts last up to 3 times longer, costly machine down-time is cut, blast-cleaned tonnage goes up. These savings, in terms of dollars and cents, often amount to as much as 80% of total blast cleaning costs.

TEST MALLEABRASIVE in your plant. The Pangborn Corporation will provide all necessary charts and equipment. See for yourself why Malleabrasive is *guaranteed* to outperform conventional abrasives when these comparative tests are made. Write for free TEST KIT today! Address: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Maryland.

Look to Pangborn for the Latest Developments in Blast Cleaning and Dust Control Equipment

Use Pangborn's free ABRASIVE ANALYSIS SERVICE!

Pangborn Service Engineers are skilled specialists, backed by Pangborn's 46 years' experience with blast cleaning and as pioneers with metallic abrasives. These men can tell you which size Malleabrasive will save you the most money for your type of work. Ask for a free recommendation. In your letter just tell us what you clean and the type of equipment you use.

Pangborn

BLAST CLEANS CHEAPER with the right equipment for every job

*U. S. Patent #2184926
(other patents pending)

Pouring it on — and no interruptions — straight line production. In this foundry they're doing things in a big way—are pleased with the result — PROFIT! For modern, mechanized foundry operations — single units or complete systems — call in a Jeffrey engineer.

THE JEFFREY MANUFACTURING COMPANY

ESTABLISHED 1877

907 North Fourth St., Columbus 16, Ohio

Complete Line of Material Handling, Processing and Mining Equipment

Baltimore 2, Beckley, W. Va., Birmingham 3, Boston 16, Buffalo 2, Chicago 1, Cincinnati 2, Cleveland 15, Denver 2, Detroit 13, Harlan, Ky., Houston 2, Jacksonville 2, Milwaukee 2, New York 7, Philadelphia 3, Pittsburgh 22, St. Louis 1, Salt Lake City 1, Scranton 3

Jeffrey Mfg. Co. Ltd., Montreal, Canada
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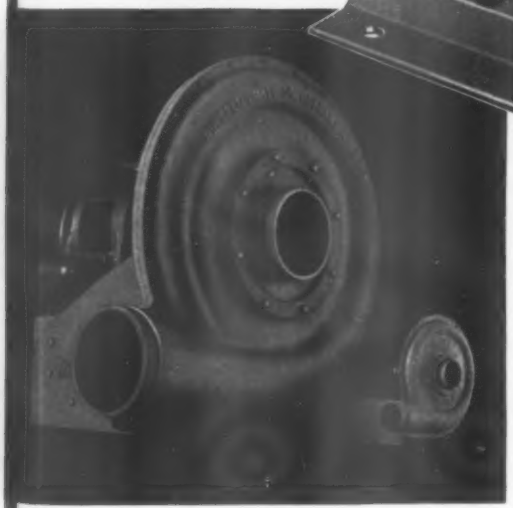
The Ohio Malleable Iron Co., Columbus, Ohio
British Jeffrey-Diamond Ltd., Wakefield, England
The Galion Iron Works & Mfg. Co., Galion, Ohio
The Kilbourne & Jacobs Mfg. Co., Columbus, Ohio

CUPOLA BLOWING ECONOMY

with these space-saving "Buffalo" BLOWERS



"Buffalo" "E" BLOWERS have constant characteristics over a wide range of capacity. In sizes for capacities up to 5500 c.f.m. and pressures up to 55.2" of water, and a wide variety of smaller sizes. Rugged, efficient one-piece units that are economically installed. WRITE FOR BULLETIN 3014-C.

New! More Efficient Than Ever Before!

These new "Buffalo" Type "CB" Pressure Blowers pack maximum pressure service into minimum installation space—up to 2¼ psi, single stage!

A great deal of research by the "Buffalo" organization offers many improvements that add up to greater economy on the job. "Buffalo" CB Blowers are now more compact than ever before, yet more efficient, lighter and stronger. The dynamically balanced rotors are of heavy steel plate, riveted or welded. The steel plate housing sides are ribbed for extra strength. Capacities, from 150 c.f.m. to 8000 c.f.m. WRITE FOR BULLETIN 3553-A for complete description including dimensions and performance ratings.

"Buffalo" FIRST FOR FANS

BUFFALO FORGE COMPANY

221 MORTIMER ST. BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont., Branch Offices in all Principal Cities

VENTILATING FORCED DRAFT | AIR WASHING COOLING | AIR TEMPERING HEATING | INDUCED DRAFT EXHAUSTING PRESSURE BLOWING

HERE'S THE CRANE FOR

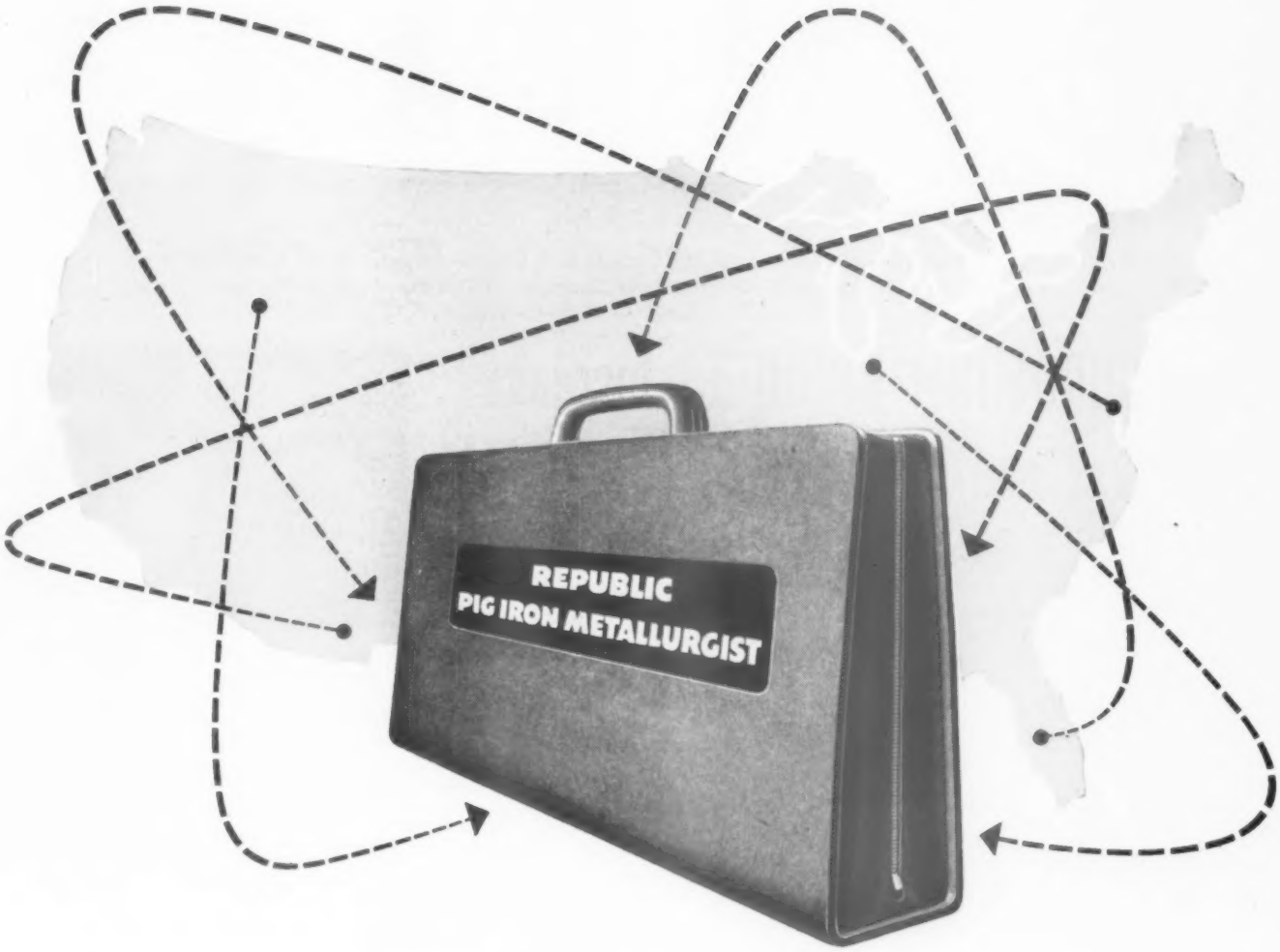
CONSTANT SERVICE *at* HIGH SPEED

If your handling operations must be "on the go all the time and fast, too", then investigate this American MonoRail Crane. Coupled with constant service at high speed, it offers the advantages of easy movement, rugged construction, low-cost operation and quick installation. But the No. 1 advantage is articulated trolleys. When each trolley wheel carries its share of the load in perfect alignment with the craneway tracks and all possible friction is eliminated, the result is perfectly articulated trolley travel. Applied to American MonoRail Cranes, these articulated trolleys permit operating speeds of 500 feet per minute and constant service. Breakdowns are practically eliminated and the crane is ready for fast service at all times.

An American MonoRail engineer will gladly give you all the details, or write us about the American MonoRail Constant-Service High-Speed Crane.

THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE **CLEVELAND 7, OHIO**



This brief case really gets around!

Truly a traveling brief case, is the one carried by a Republic Pig Iron Metallurgist. Equally at home in Mainliner cabin, Pullman berth or fast-moving car, it's often heading for trouble . . . foundry trouble that needs to be corrected.

Other times, it is on its way to forestall trouble . . . furnishing the answers to routine questions about molding practice . . . offering suggestions for improving castings or cutting production costs.

As countless foundrymen will testify, it never stays long enough to wear out its welcome, but its visit seldom is soon forgotton.

Perhaps you have some unanswered questions or unsolved problems which might be cleared up by a visit from a Republic Pig Iron Metallurgist. Just let us know when you would like him—and the brief case—to stop.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

Republic PIG IRON

"CHATEAUGAY" Low-Phosphorus, Copper-Free

"REPUBLIC" (Northern) Foundry, Basic and Malleable

"PIONEER" (Southern) Foundry and Basic

REPUBLIC STEEL

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Advertisement

ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Division, Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

How CHROMIUM BRIQUETS Increase Hardness and Strength of Cast Iron

Chromium briquets are made especially for the addition of chromium to cast iron in the cupola. The amount added may vary from small percentages up to as high as 15 per cent.

Function of Chromium in Cast Iron

Chromium is added to cast iron for the purpose of refining the grain and stabilizing the combined carbon content, thus increasing strength, hardness, and resistance to wear and abrasion. Even very small additions of chromium have a decided effect, and as little as 0.25 to 0.50 per cent will yield a great improvement in iron used for resistance to wear. A typical application is in automotive cylinder castings, particularly in heavy-duty truck and tractor work.

The stabilizing and refining effect of chromium is particularly useful to foundrymen producing castings of medium to heavy section. The slow cooling of such castings often results in weak, open-grained iron. Chromium in amounts up to 1.00 per cent will increase the stability of the structure of the castings and help to offset the effect of slow cooling in the mold.

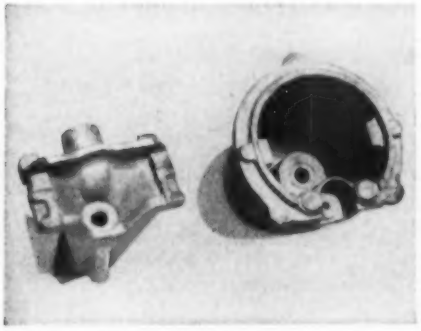


Fig. 1—These low-chromium iron castings, which are parts for a die-casting machine, are machinable, uniformly hard, and resistant to the effect of high temperature.

High-Temperature Service

The strong effect of chromium in stabilizing the structure of gray iron has made its use in iron subjected to high temperatures almost universal. Chromium in the range of 0.75 to 1.25 per cent greatly reduces the growth and warping that occur in unalloyed irons as the result of repeated heating and cooling. Chromium cast irons in this range of chromium content may be inoculated with silicon alloys to decrease the tendency to chill and, also, to assist in maintaining machinability. Such irons are adaptable to various high-temperature applications, such as melting pots, die-casting machine parts, grate bars, etc.

How Binder Protects Chromium

For the addition of chromium to cast iron, ELECTROMET produces briquets containing exactly 2 lb. of chromium each. The alloy is protected by a refractory binder, which has a high melting point and, therefore, helps to prevent oxidation of the chromium until it is melted and delivered to the crucible of the cupola.

The recovery of chromium from "EM" briquets is thus uniformly high, normally above 85 per cent, and it is easy to obtain the desired final chromium content. This is of particular importance when the limitations of hardness and machinability for a casting demand close chemical control.

Typical Briquet-Iron Mixture

The use of "EM" chromium briquets in the production of cast iron of low chromium content is shown in the table below.

Fig. 2—"EM" chromium briquets are hexagonal in shape, and each contains exactly 2 lb. of chromium. Notched briquets (right), which are easy to break in half, can be purchased for use when 1 lb. additions of chromium are desired.

The mixture given is for a medium-strength iron used for castings in which resistance to wear or heat is required.

Booklet Available

Typical briquet mixtures for other types of irons are given in the booklet "Briquetted Alloys for the Iron Foundry Industry." This booklet also contains information about "EM" briquets of silicon, silicomanganese, and ferromanganese. If you would like a copy, free of charge, simply write to the address given above or to the ELECTROMET office nearest to you. Offices are in Birmingham, Chicago, Cleveland, Detroit, Los Angeles, New York and San Francisco. In Canada: Welland, Ontario.

The terms "EM" and "Electromet" are registered trade-marks of Union Carbide and Carbon Corporation.

Typical Briquet Mixture for Low-Chromium Iron

Base Charge			Alloys in Charge Material					
			Silicon		Manganese		Chromium	
Per Cent	Lb.	Material Charged	Per Cent	Lb.	Per Cent	Lb.	Per Cent	Lb.
20.0	200	Pig Iron	2.25	4.50	0.85	1.70	—	—
30.0	300	Return Scrap	2.00	6.00	0.75	2.25	0.57	1.71
30.0	300	Purchased Scrap	2.00	6.00	0.65	1.95	—	—
20.0	200	Steel Scrap	0.10	0.20	0.45	0.90	—	—
100.0%	1,000 lb.	Total Base Charge		16.70 lb.		6.80 lb.		1.71 lb.
Briquets Required		5 Silicon Briquets		5.00		—		—
		1 Silicomanganese		0.50		2.00		—
		2½ Chromium Briquets		—		—		5.00
		Total Alloys Charged		22.20 lb. Si or 2.22% Si		8.80 lb. Mn or 0.88% Mn		6.71 lb. Cr or 0.67% Cr
		Melting Recovery		x .90		x .85		x .85
		Final Iron Analysis		2.00% Si		0.75% Mn		0.57% Cr

Can You Top this?

The Chemalloy Foundry Company of Louisiana, Missouri, speaks for M C Dip-Out Furnaces

Here is actual proof of the economy that Stroman M C Reverberatory Dip-Out Furnaces for aluminum effect in actual operation. They are a combination of melting and holding furnaces that produce the highest quality casting and always have hot metal available for dipping. They are ideal for permanent mold, die casting, or sand casting plants. Bath capacities range from 500 to 10,000 pounds. Jim Maddern of Chemalloy says the rest. Install a Stroman M C in your plant and turn these savings into profits, while making working conditions much more pleasant for your men!

CHEMALLOY FOUNDRY COMPANY

ALUMINUM — BRONZE — BRASS CASTINGS
PERMANENT MOLDING

LOUISIANA, MISSOURI

June 14, 1950

Mr. J. L. Stroman
Stroman Furnace & Engineering Company
9900 Franklin Avenue
Franklin Park, Illinois

Dear Mr. Stroman:

We have just finished checking costs with our auditing department and have come up with some astonishing facts and figures which to us are pleasing to say the least. So, I am passing them on as I am sure you would like to know how your furnaces compare to others.

The M C Reverberatory Aluminum Furnace we bought from you a year ago certainly was the finest investment we ever made. Here are actual costs of operation on the M C and former pot equipment for one year on a production schedule of a monthly melt of 200,000 lbs. with a 100,000 lb. yield. We found that pot furnaces cost as follows:

Fuel	$5200.00
Direct Labor	5400.00
Indirect Labor	8000.00
Total	2750.00
	$21,350.00

The one M C we are now operating to replace the pots costs as follows:

Refractory Lining	$ 400.00
Fuel	2400.00
Direct Labor	6000.00
Indirect Labor	470.00
Total	$9270.00

That this saving of $12,080.00 in one year's time with one furnace, makes us very happy is needless to say. Also, our men find it much easier to work with and around, and it gives us happier personnel.

Congratulations on the design of such a fine piece of equipment, and you can bet from now on all our furnaces will be Stromans.

Very truly yours,

CHEMALLOY FOUNDRY COMPANY

James Maddern
President

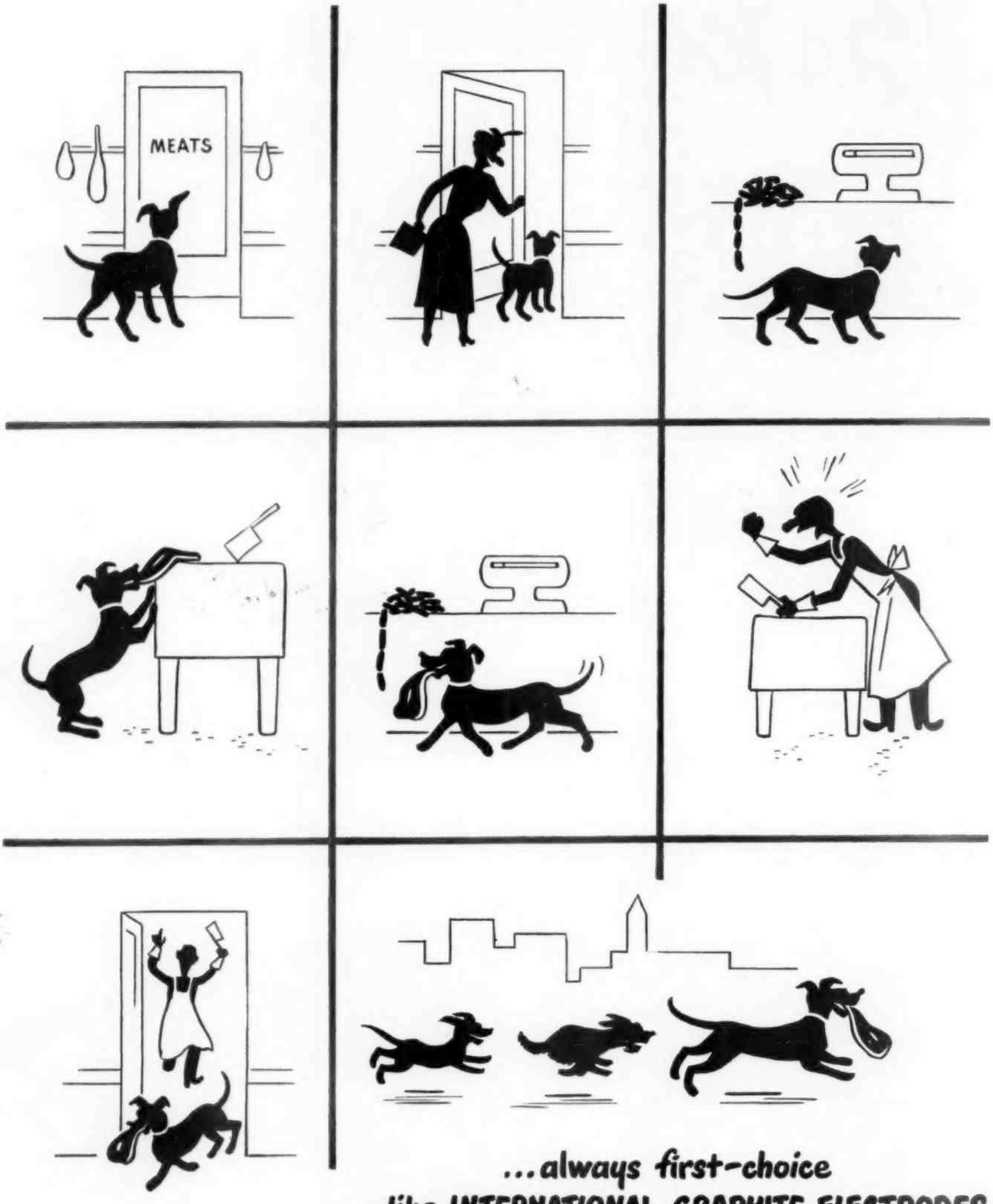
JM:er

Second Turnover Order

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.



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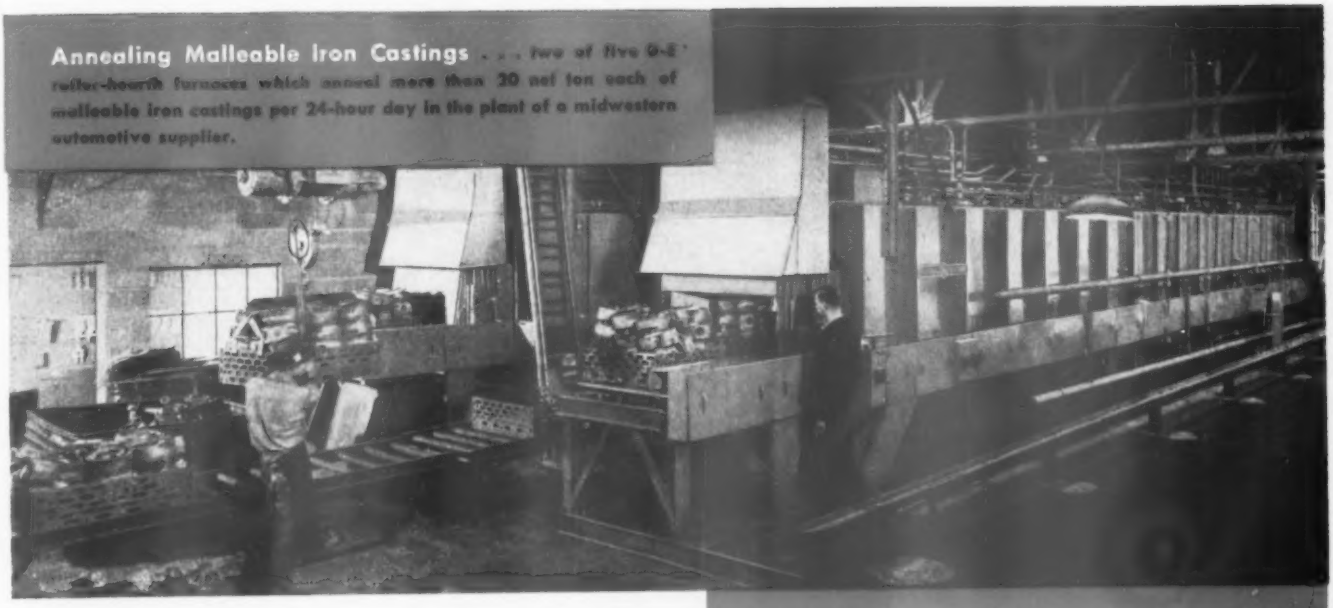


Annealing Malleable Iron Castings . . . two of five G-E roller-hearth furnaces which anneal more than 30 net ton each of malleable iron castings per 24-hour day in the plant of a midwestern automotive supplier.

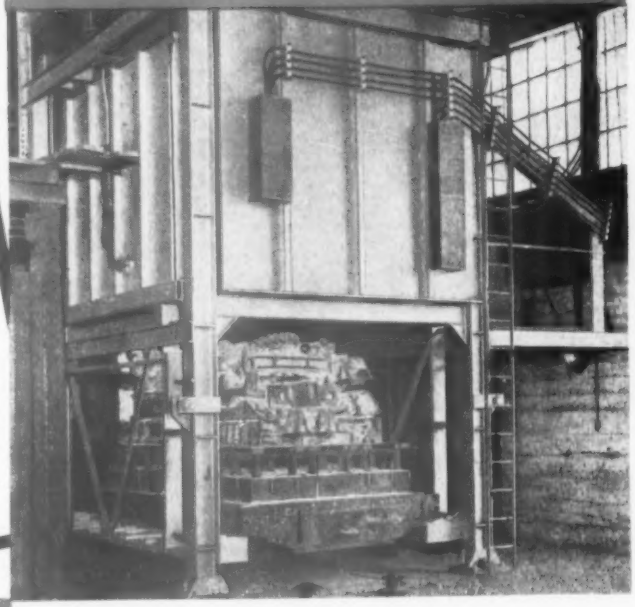
Do It Better Electrically

Electric Furnaces

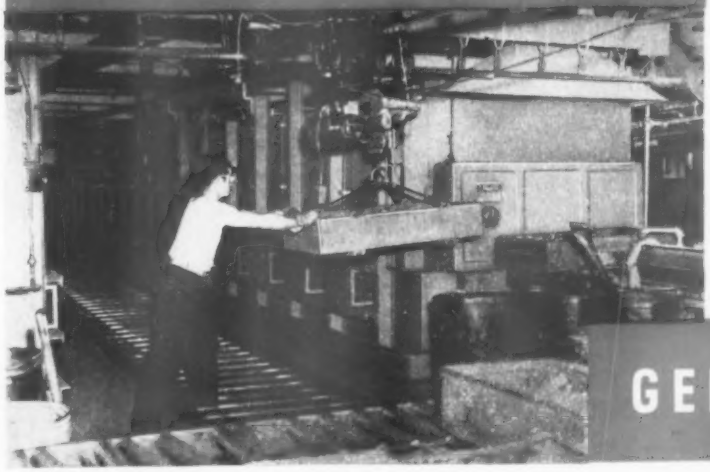
In addition to a shorter time cycle and increased output, they also give you:

Lower over-all cost
More uniform, better quality anneal
Materially reduced cleaning costs
Minimized thermal losses
Cleaner, cooler working conditions
Dependable continuity of service with less maintenance
Less floor space required

Annealing Steel Castings . . . one G-E elevator furnace anneals 10 tons of steel castings per charge in this southern foundry.



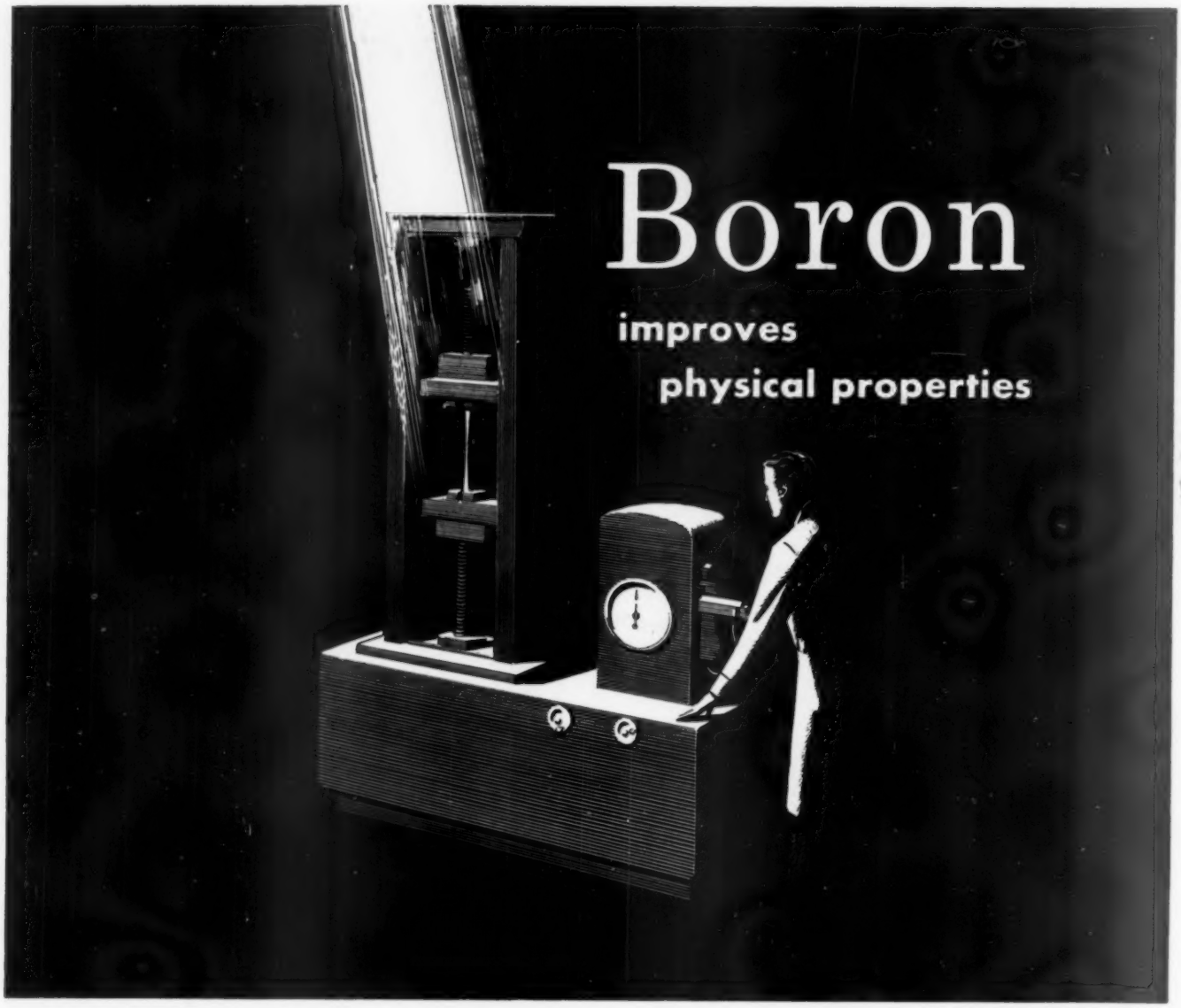
Annealing Grey Iron Castings . . . two pusher-type G-E furnaces anneal 30 tons of grey iron castings per day in this eastern plant.



Tell us about your annealing job, and we'll show you what General Electric furnaces can do for your particular operation. G-E furnaces and electronic induction heaters are also available in a variety of types and ratings for brazing, hardening, drawing, soldering, carburizing, and most other heat-treating processes. Ask your nearest G-E office to put you in touch with a G-E Industrial Heating Specialist. Or write direct to ***Sect. 720-25, Apparatus Department, General Electric Company, Schenectady 5, N. Y.***

GENERAL ELECTRIC

720-25



IN wrought steel—cast steel—malleable iron—cast iron—small additions of Ferro-Boron lead to economy and better performance. Boron alloys are useful in deoxidation processes. In the spraying and welding of metals also, Boron has important uses.

Scarcer elements like molybdenum, tungsten, chromium, and nickel can be employed more sparingly if Boron is judiciously added. Very small percentages improve hardenability and strength to a marked degree.

A new patented method developed by the Molybdenum Corporation (U.S. Patent 2509281) incorporates Boron in iron and steel more economically and with more uniform results than could ever before be obtained. Inquiries on any use of Molybdenum, Tungsten, or Boron will receive prompt attention.

AMERICAN Production, American Distribution, American Control, Completely Integrated

Offices: Pittsburgh, New York, Chicago, Cleveland, Detroit, Los Angeles, San Francisco, Seattle

Sales Representatives: American Steel and Supply Co., Chicago; Edgar L. Fink, Detroit; Brumley-Donaldson Co., Los Angeles, San Francisco, Seattle

Subsidiaries: Cleveland-Tungsten, Inc., Cleveland, O.; General Tungsten Manufacturing Co., Inc., Union City, N.J.

Works: Washington, Pa.; York, Pa.

Mines: Questa, New Mexico; Urad, Colorado.

MOLYBDENUM CORPORATION OF AMERICA
Grant Building Pittsburgh, Pa.

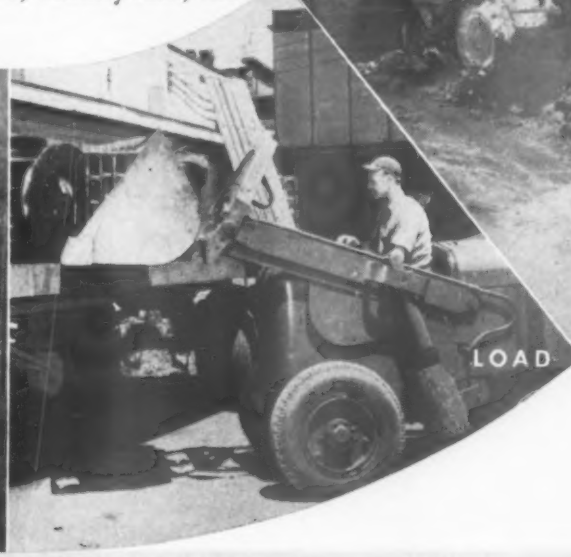
MCA

Pick PAYLOADERS

FOR THE *BULK* OF YOUR MATERIAL HANDLING

Payloaders are a proven, successful bulk-material-handling system in hundreds of foundries and metal working plants. They handle and rehandle sand, slag, coke, castings, stone, clay, scrap, sprues and waste materials fast and cheaply . . . eliminate many slow, laborious, costly operations.

Large pneumatic tires, short wheel bases and multiple speeds in both directions provide traction and maneuverability on or off hard floors, up ramps, through doorways and narrow aisles. It will pay *you* to find out how Payloaders can slash *your* material handling costs. See your Hough Distributor or write The Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.



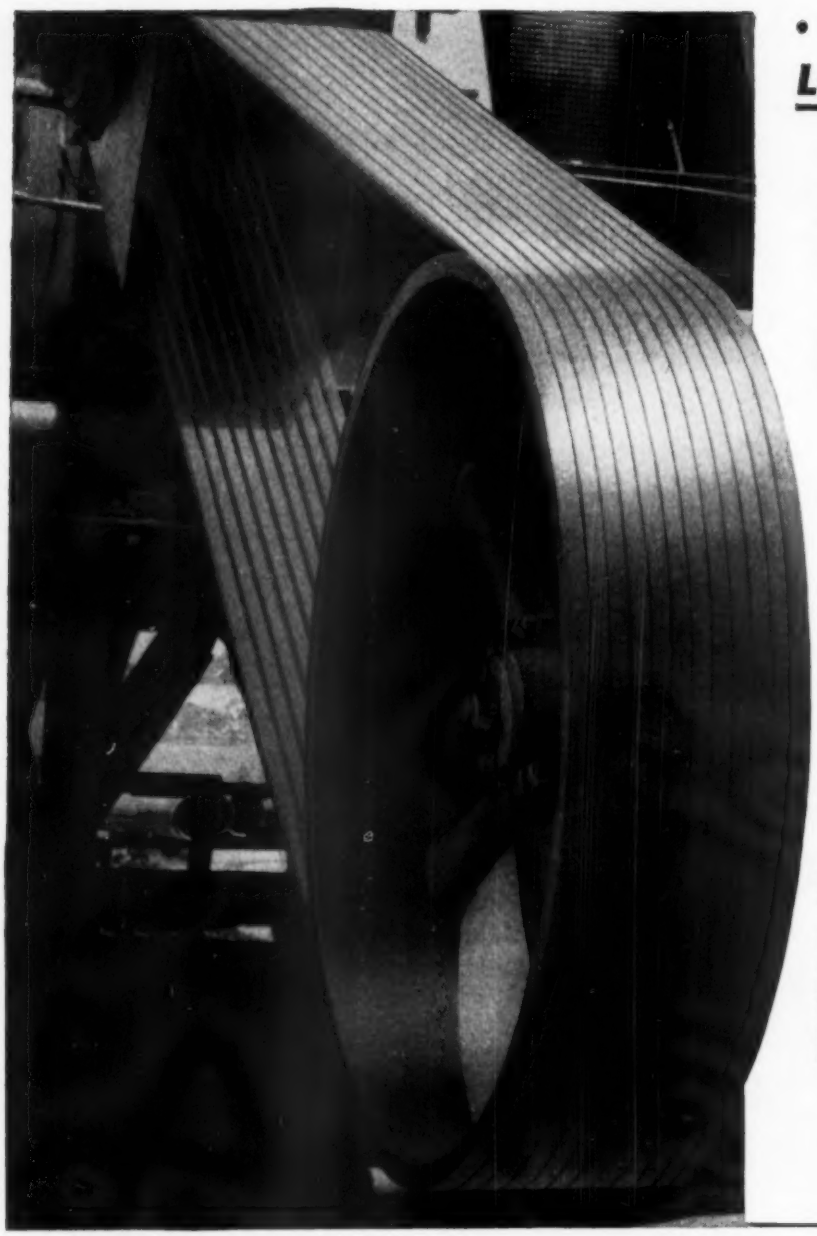
Send for catalogs on any size Payloader: the 12 cu. ft. Model HA; the ¾ yd. HF; the 1¼ yd. HL; the 1½ yd. HM. There is no obligation.

SAY HUFF

HOUGH PAYLOADER

Manufactured by THE FRANK G. HOUGH CO.

WE CALL THEM "BULL DOGS" —you'll call them "WORKHORSES"



. . . these Tough Longer-Lasting V-Belts

TODAY with production at peak levels it pays to put your money on the right horse—a V-Belt that's a real "workhorse"! Dependable Bull Dog V-Belts have the built-in stamina that assures longer, no downtime operation that keeps production up and maintenance costs down.

And here are 4 reasons why Bull Dog V-Belts give you more for your belt money in trouble-free service, less slippage and savings through longer life:

1. Specially Engineered BWH Cord Section has high tensile strength. Result: superior load carrying capacity and ability to absorb shock loads.

2. Minimum Stretch — due to a new and exclusive technique in processing Bull Dog Cords. Result: less slippage, fewer adjustments, extended life of the belt.

3. Durable Covers — closely woven, heavy, bias-cut fabric takes the severe wearing action where the belt contacts the sheave and seals the belt against the penetration of dirt, grease, moisture.

4. Takes Punishing Flexing — BWH technologists with a 72-year background of leadership in mechanical rubber products have developed quality-controlled compounds which run cooler and do not crack or deteriorate under severe flexing.

If you're using Bull Dog V-Belts now — more power to you. If not, it will pay you to switch — ask your BWH distributor.

TOUGH PROBLEMS INVITED — Don't hesitate to ask us or your nearest BWH distributor about your power transmission belting, conveyor belting and hose problems. We're specialists in making mechanical rubber products work *better, longer.*

BWH

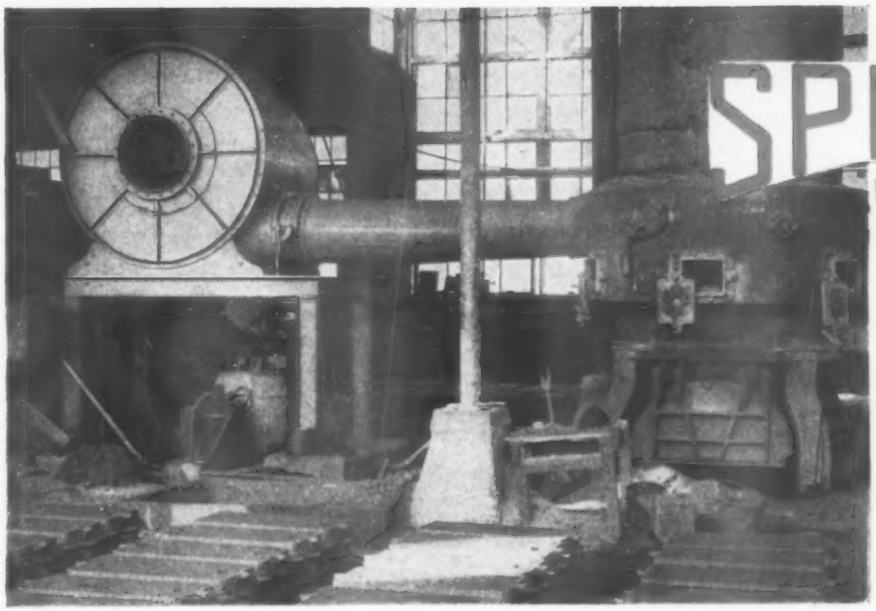
DEPENDABLE RUGGEDNESS

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.



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SPENCER TURBO-COMPRESSORS

SPENCER HARTFORD

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

A good, dependable air supply is the heart of any foundry operation. Once the amount of air for a given charge is determined, the Spencer Turbo will continue to provide the desired amount, day in and day out for years without interruption.

This dependability is built-in. With wide clearances, only two bearings to grease and an all-metal bridge-like construction, there is little that can go wrong even in the most severe and prolonged service.

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The control may be manual, by means of a calibrated ammeter and blast gate, or complete automatic air-weight control with recording charts may be used. Ask for the Spencer Foundry Bulletin No. 112.

7½ HP *Heavy Duty*

And for Foundry Housekeeping——

Spencer Industrial Portable Vacuum Cleaners are solving the housekeeping problem in all types of foundries, large and small. Periodic overhead cleaning, picking up molding sand and cleaning molds, patterns and finished castings are a few of the jobs that make Spencer Vacuum pay for itself in a few months. Bulletins on request.

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

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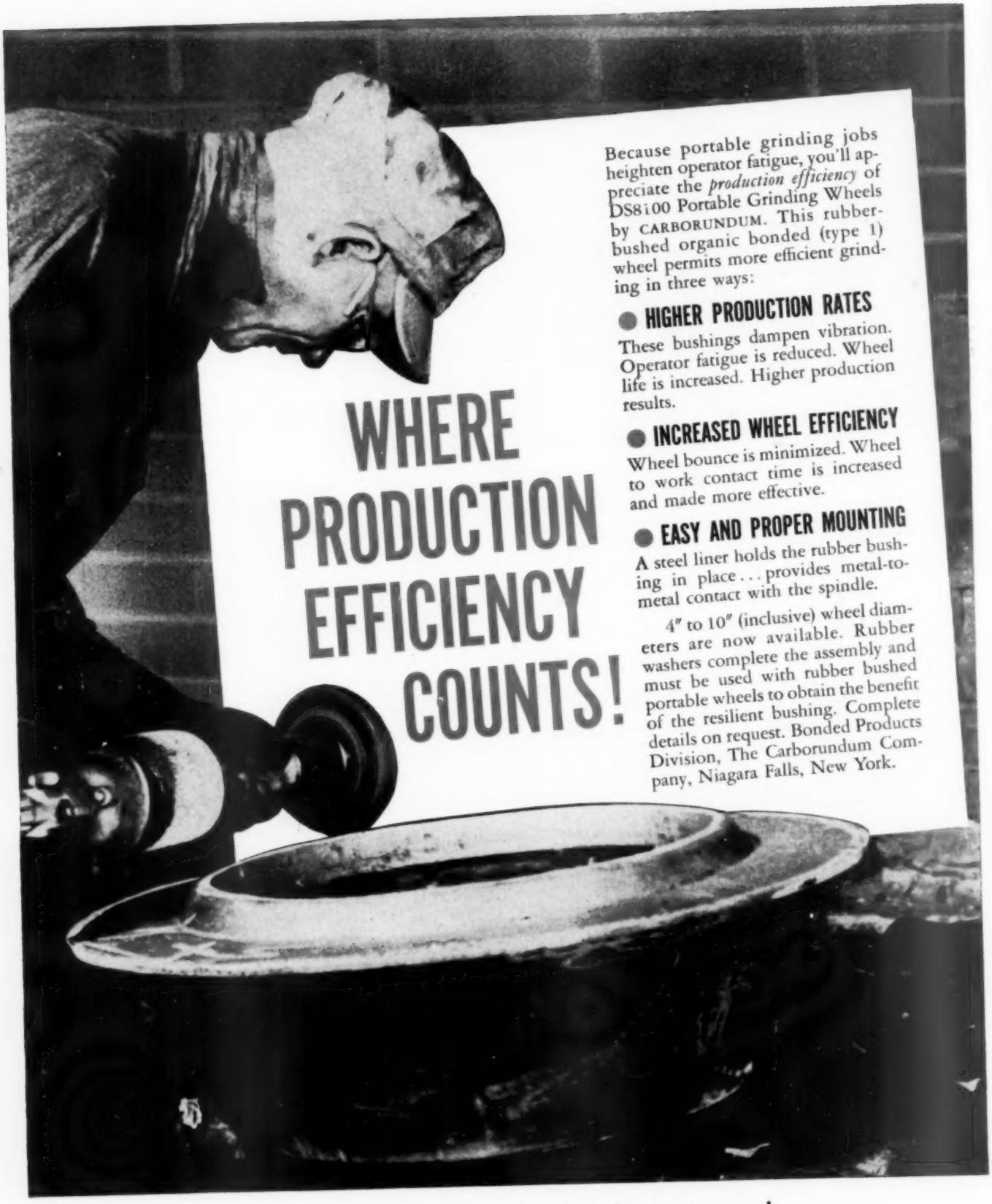
WHERE PRODUCTION EFFICIENCY COUNTS!
Because portable grinding jobs heighten operator fatigue, you'll appreciate the *production efficiency* of DS8100 Portable Grinding Wheels by CARBORUNDUM. This rubber-bushed organic bonded (type 1) wheel permits more efficient grinding in three ways:
● HIGHER PRODUCTION RATES
These bushings dampen vibration. Operator fatigue is reduced. Wheel life is increased. Higher production results.
● INCREASED WHEEL EFFICIENCY
Wheel bounce is minimized. Wheel to work contact time is increased and made more effective.
● EASY AND PROPER MOUNTING
A steel liner holds the rubber bushing in place . . . provides metal-to-metal contact with the spindle.
4" to 10" (inclusive) wheel diameters are now available. Rubber washers complete the assembly and must be used with rubber bushed portable wheels to obtain the benefit of the resilient bushing. Complete details on request. Bonded Products Division, The Carborundum Company, Niagara Falls, New York.

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Atlanta, Boston, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, Jersey City, Philadelphia, Pittsburgh, St. Louis, San Francisco

Bonded Abrasives by

CARBORUNDUM

TRADE MARK

Making ALL abrasive products . . . to give you the proper ONE

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company

Here's DURATEX . . .

AO's Economical Heavy-Duty Protection Against Oil, Heat, Sparks, Abrasion

AO DURATEX

In one thriftily-priced, long-wearing fabric — AO now offers 4-way protection for jobs where handling oily, greasy, abrasive or hot materials is a problem. While heavily woven to provide maximum protection, Duratex is remarkably flexible for working comfort! Your AO Safety Products Representative can supply you with this heavy-duty protection in mittens, hand pads, sleevelets.

NEW! 4X718 SLEEVELET (10½" long—has snap button adjustment at wrist)

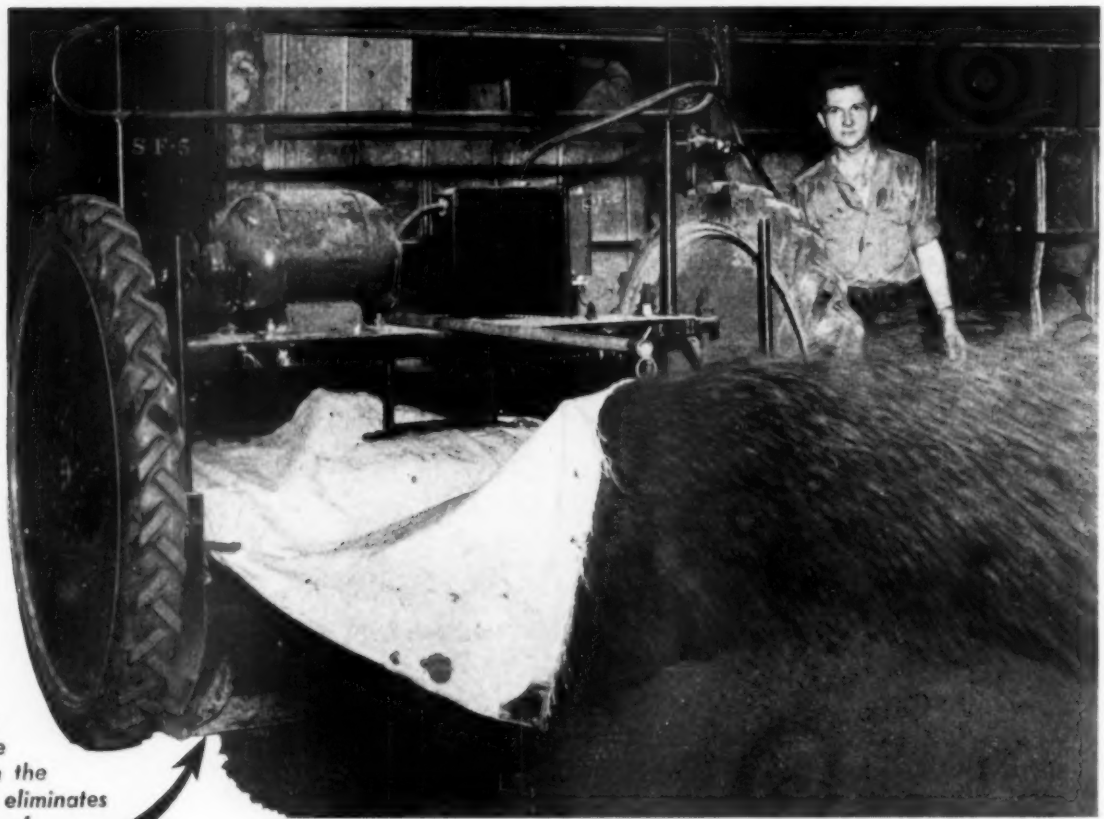
NEW! 8X238 REVERSIBLE HAND PAD (7" long)

NEW! AO 6X259 REVERSIBLE OPEN END MITTEN (8" long) also available as 6X260 (9½" long)

American Optical COMPANY
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

DO YOU NEED THOROUGHLY CONDITIONED SAND TO MAKE BETTER CASTINGS?



This drag scoops the sand from the floor and eliminates any layer of unconditioned sand

This Moulders' Friend was rolled off a truck on to the floor of a North Carolina foundry where it conditioned all of the moulding sand without any rearrangement of the heaps. The Moulders' Friend will fit your foundry too.

THE MOULDER'S FRIEND GIVES YOU THOROUGHLY CONDITIONED SAND

The thousands of flat tempered steel wires in the brush revolving at high speed pick up small particles of used sand, added bond and moisture and blend them thoroughly. This process is so thorough that either clay bond or new moulding sand is blended with the heap successfully and a minimum ot moisture is required.

THE BRUSH DOES THE JOB

●

THE MOULDER'S FRIEND SAVES MONEY . . .

capacity over one ton per minute—one man operation—simple construction—easy to buy and use—pays for itself with better castings and less labor.

Investigate The Moulders' Friend today. See one in operation.

"The Moulders' Friend"
Dallas City, Illinois

MELTRITE

PIG IRON

Highest Quality

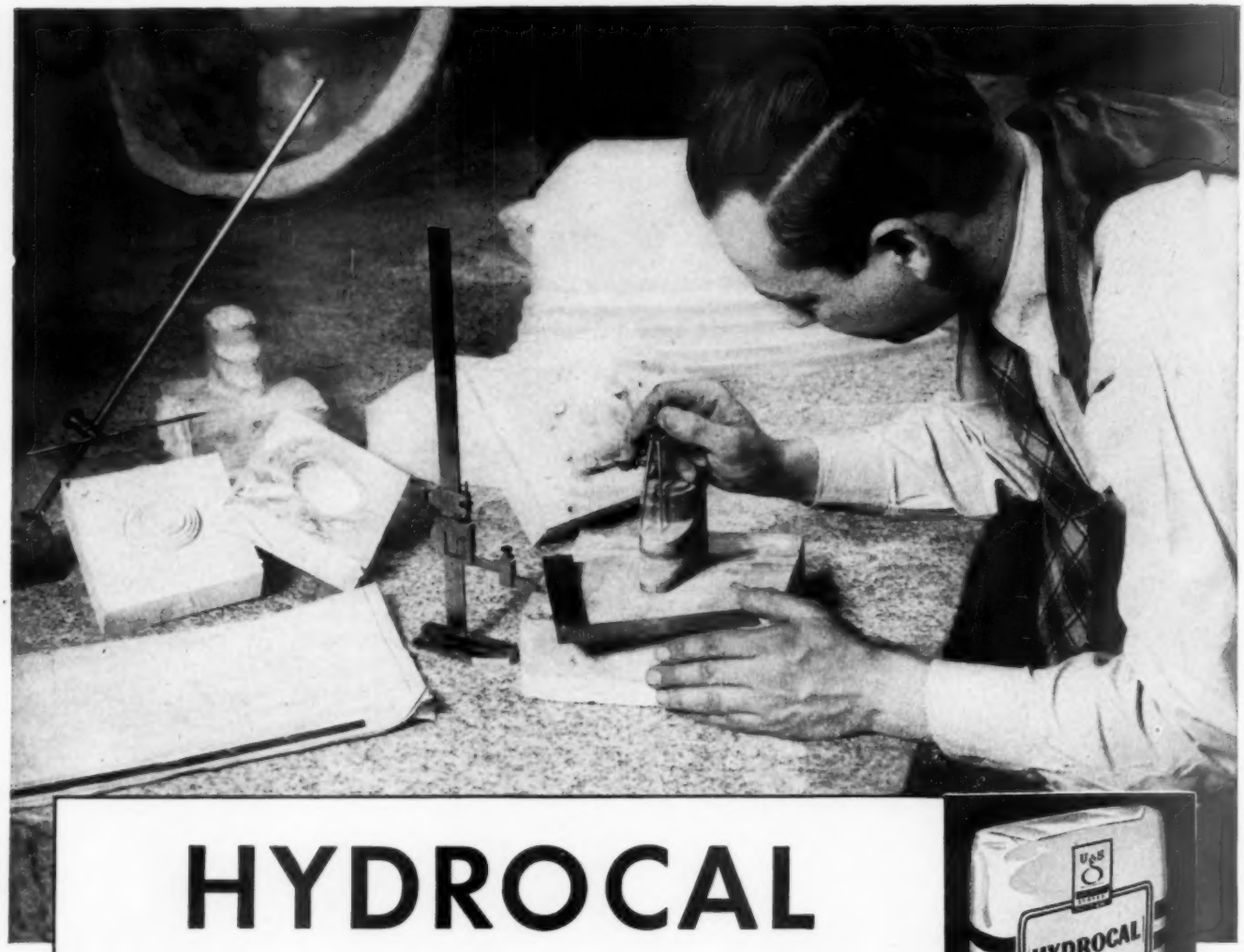
MORE USED THAN ANY OTHER MERCHANT PIG IRON

P M

SIXTY-SEVEN YEARS OF
SERVICE TO INDUSTRY

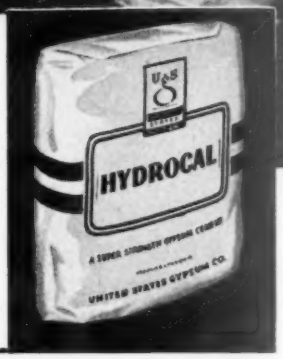
PICKANDS MATHER & COMPANY
UNION COMMERCE BUILDING • CLEVELAND 14, OHIO
CHICAGO • CINCINNATI • DETROIT • DULUTH • ERIE • GRAND RAPIDS
GREENSBORO • INDIANAPOLIS • MINNEAPOLIS • ST. LOUIS • WASHINGTON

IRON ORE • PIG IRON • COAL • COKE



HYDROCAL

For Fast, Accurate, Low-cost Patterns



Marc Andrews, head of Marco Manufacturing Co., Akron, Ohio, uses large quantities of HYDROCAL* Gypsum Cement for precise master patterns and fast experimental work. Here's why . . .

It's fast working—particularly for irregular, intricate models and patterns. Readily adaptable to complex curves, contours and intersections . . . is easy to modify and add to.

It's accurate—HYDROCAL patterns are accurate to .005" per inch. Finished work is dimensionally stable and is unaffected by normal changes in shop temperature and humidity.

It's economical—HYDROCAL helps reduce material costs, saves pattern-making time. Simple, inexpensive equipment is all that's needed for fabricating, and sectional dies are easily, quickly reproduced from full scale mock-ups.

For detailed information on this versatile pattern-making material, contact your local U.S.G. Sales Engineer; or write, Industrial Sales Division, Dept. 139-F, 300 W. Adams St., Chicago 6.

Types of Hydrocal for Pattern Shops

HYDROCAL B-11, for built up or template formed models or patterns.

HYDRO-STONE*, hardest and strongest gypsum cement for duplicate patterns. Must be cast. Cannot be worked under template.

High Expansion HYDROCAL, to expand dimensions of a pattern to compensate for metal shrinkage.

Other HYDROCALS for special uses.

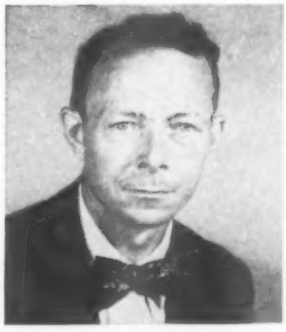
*HYDROCAL and HYDRO-STONE are trademarks reg. U. S. Pat. Off. for a super-strength gypsum cement manufactured by U. S. Gypsum Co.

United States Gypsum

For Building • For Industry

In Canada, CANADIAN GYPSUM COMPANY, Limited, 170 Bloor St., West Toronto, Ontario

THIS BELT KICKS OUT FOUNDRY GATES



Here is Mr. Eugene Brown, NYB&P Distributor, who has a customer whose conveyor belt was being torn and gouged by razor-sharp foundry gates.

Mr. Brown* solved the problem by specifying the NYB&P belt shown above, for this shake-out service. Within the structure of this belt, special segments have been built that kick out destructive gates before they get a chance to do serious damage. It has a tough, heat-resistant cover and is flexible enough to trough easily, thereby allowing for maximum loads.

It saves users considerable time and money by giving greater trouble-free service than any comparable belt of conventional construction. These are some of the reasons why its owner, like so many other NYB&P users, refused to order any other brand.

Whenever you have a problem involving mechanical rubber goods, consult your NYB&P Distributor. Rely on his help and practical advice. His reputation has been built on his ability to keep production lines moving and to supply you with the right item at the right time.

**Brown Engineering Co., Reading, Pennsylvania.*

NEW YORK BELTING & PACKING COMPANY
1 MARKET STREET, PASSAIC, NEW JERSEY

Is this Your Work?

- ☐ Laboratory Melting
- ☐ Precision Casting
- ☐ Melting Gold, Silver, Platinum, other precious metals
- ☐ Melting Non-Ferrous Alloys up to 60 lbs.
- ☐ Melting Ferrous Alloys up to 30 lbs.

Get Closer Control with this *FASTER* Ajax-Northrup 20-KW. Furnace

If your melting calls for a hard-boiled combination of melting speed, superfine control, and overall economy, this Ajax-Northrup 20 kw. converter-operated induction furnace can do the job. Melts 30 lbs. of brass in 20 minutes. 17 lbs. of steel in 35 minutes. No carbon contamination—no oxidation. Precise control of composition and temperatures . . . even with alloys that are "impossible" to handle in other furnaces.

Self-tuning. No adjustments required while melting. No moving parts to wear out. Maintenance is limited to annual inspection of two electrodes. Flexible . . . easy, quick changeover from one alloy to another. Built also in 3, 6, and 40 kw. sizes. Generator operated units to 1200 kw. and 8 tons. Send today for free bulletins covering any melting or heating problem.

This is Your Bulletin

AJAX ELECTROTHERMIC CORPORATION
AJAX PARK • TRENTON 5, N. J.

Associate Companies

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AJAX ELECTRIC FURNACE CORPORATION
AJAX ELECTRIC COMPANY, INC.
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123

AJAX NORTHRUP

HEATING & MELTING

America's Greatest
QUALITY GRINDER VALUE

FREE FROM VIBRATION

FOR UNIFORMLY QUALITY GRINDING

U.S. ADJUSTABLE SPEED SNAGGING GRINDER

Model 66 . . .

THREE SPEED CHANGES

Feed this great grinder job after job . . . put it to the most gruelling tasks . . . make the most exacting demands . . . and MODEL 66 will come through with flying colors always.

Chrome-manganese steel shaft supported by four heavy-duty ball bearings enclosed in dustproof housing protected by labyrinth seals. Push button control and overload protection.

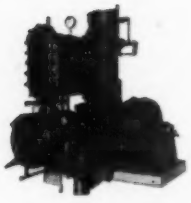
VIBRATION-FREE belt drive. Speed changes to compensate for wheel wear are made by elevating motor on its hinged tray. Patented safety device prevents over-speeding. WHEEL GUARDS ADJUSTABLE TO WHEEL WEAR.

Get in touch with your jobber. United States electrical tools are carried in stock.

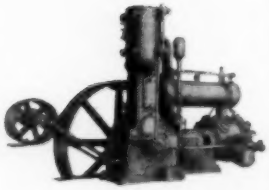
The UNITED STATES ELECTRICAL TOOL Co.
CINCINNATI, OHIO

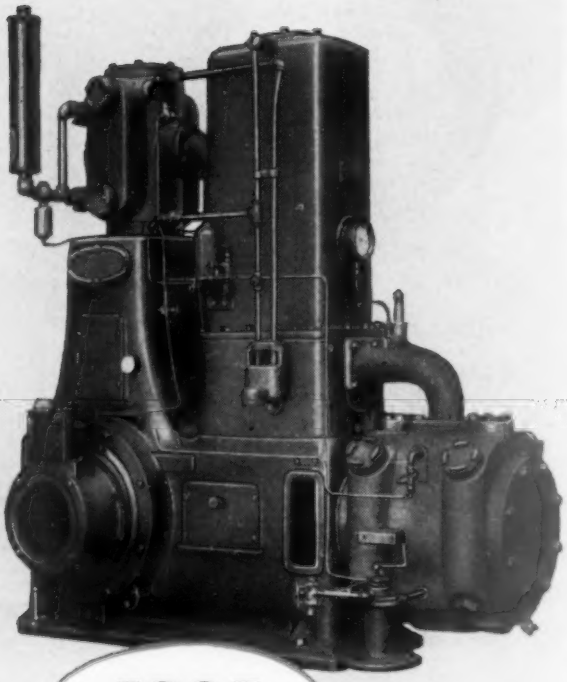
You're Years Ahead with a

THE LARGE
JOY ANGLE
OF 1930



JOY ANGLE COMPOUND
1913
THE FIRST ANGLE
OR L DESIGN





TYPICAL JOY
ANGLE OR
L DESIGN OF
25 YEARS AGO
(FIRST "PACKAGE" TYPE)

1925

1905
THE JOY CROSS COMPOUND

1885
TYPICAL JOY VERTICAL
OF 65 YEARS AGO

DESIGN–PIONEERS OF THE INDUSTRY

These seven Joy compressor illustrations and their dates tell a story of design leadership in the compression of air and gases. Here, we believe, is visual proof of the part Joy has played in the progressive development of compressor design and construction.

We are justly proud of this heritage and what it means. The design of our WN-112 and WN-114 is years ahead of the field, offering greater economies and higher efficiencies to the modern user of air power. We know because we have designed and built them all.

WaD-3242

Consult a Joy Engineer

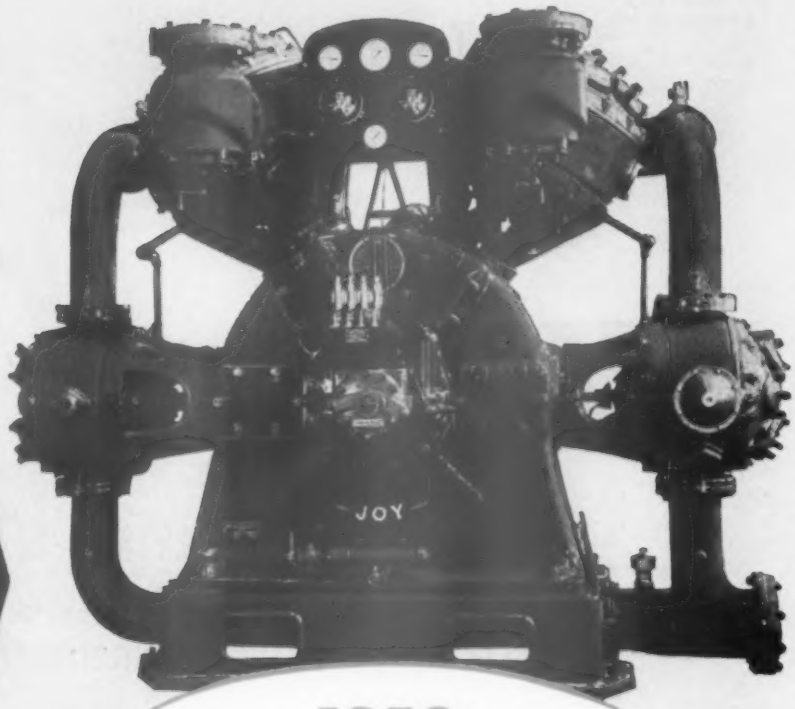
JOY COMPRESSOR

1936
JOY V VERTICAL
THE FIRST OF THE
PRESENT DAY
MODERN TYPE
COMPRESSORS

Compare

the inherent advantages of the old and the new in AIR COMPRESSORS —and insist on these advantages in <u>your</u> COMPRESSED AIR PLANT

● **Let us quote on your requirements**



1950
JOY WN-114

Compare these QUALITY CONSTRUCTION FEATURES

REPLACEABLE CYLINDER LINERS
These satin finished liners assure uniform cylinder walls for efficient heat transfer and eliminate cylinder reboring.

REPLACEABLE CROSSHEAD GUIDES
Honed "mirror-finished" wearing surfaces eliminate periodic crosshead adjustment.

BEARINGS WITH "ROLLING SURFACES"
Anti-friction, spherical roller bearings eliminate wear and need for adjustment inherent in sleeve-type bearings.

HEAVY-DUTY INTERCOOLER
Easily cleaned when necessary—insures maximum cooling for greater compressor efficiency.

LOW HEIGHT
(7 feet 7 inches) eliminates all head-room troubles when servicing or inspecting.

FORCE-FEED LUBRICATION
Use of bronze-screen, replaceable filter unit supplies clean, dirt-free oil to all bearing surfaces.

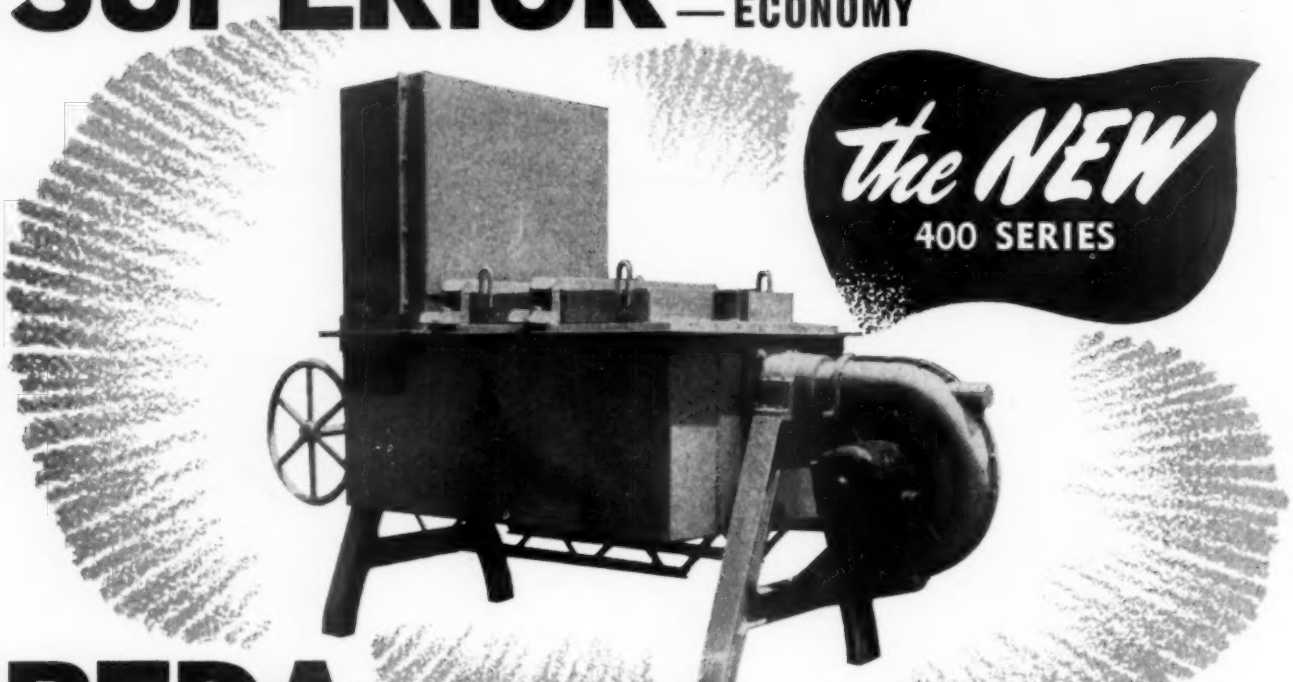
DIRECT, STREAMLINED AIR PASSAGES
Streamlined air passages with direct connection of intercooler and cylinders give maximum efficiency and minimum piping problems.

DUAL-CUSHION ANGLED VALVES
These valves, in combination with truncated pistons, give minimum valve clearance and maximum compressor efficiency.

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

SUPERIOR — PERFORMANCE — ECONOMY



REDA

REFLECTING TYPE DIRECT FIRED MELTING FURNACE

Performance and economy is the keynote of the new REDA REFLECTING TYPE DIRECT FIRED MELTING FURNACE. Advantages sought by all foundry operators, both large and small, are inherent in this cleanly designed, highly efficient furnace.

These advantages will be yours with the REDA furnace.

1. Low first cost.
2. Fast Heat—High heat; 30 minute preheat; 400# gray iron ready to pour in 20 minutes after charging; 500# brass or bronze ready to pour in 15 minutes after charging.
3. Operating Economy: Highly efficient fuel mixer and proper chamber design provide lowered fuel costs.
4. Greatest number of heats without interruption.
5. Maintenance: New type lid allows quick and easy entry to furnace for refractory maintenance.
6. Low decibel noise level.
7. Will best comply with health requirements of intra-city installation.

Write for Complete details to: FURNACE DIVISION—

REDA PUMP CO.

BARTLESVILLE, OKLAHOMA

Cut core baking time 50%...with Monsanto RESINOX core bonding resins

You can double the capacity of your core baking ovens—cut baking cycles up to 50% or more — by switching to Monsanto's Resinox phenolic resins for core bonding. No extra equipment needed. Here are *additional* advantages reported by foundries where Resinox is being used as a bonding agent for the core sand:

Better Cores . . . Better Castings — **1** Resinox bonded cores have higher baked tensile strength and hardness . . . thus core breakage is reduced. Cores have a finer surface finish, producing castings with smoother surfaces and more accurate detail.

Longer Storage . . . Better Collapsibility — **2** Cores made with Resinox can be stored for indefinite periods with a minimum of deterioration. Resinox bonded cores possess adequate hot strength yet collapse readily and completely, greatly assisting shake-out and reducing scrap from hot tears.

Speed Production . . . Lower Costs — **3** Use of Resinox greatly reduces smoke nuisance in the plant, resulting in improved working conditions and increased worker efficiency.

Resinox Finds New Use In "C" Process

In the "C" Process, Monsanto's Resinox dry resin compounds are used to bond sand to produce thin, extremely lightweight foundry molds. This new technique promises to revolutionize the foundry industry. Its advantages include: exceptional dimensional accuracy, extremely fine surface finish, greater rate of production, better metal yields. Write today for production information about the use of Resinox resins for core bonding and for the "C" Process. Resinox Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS — PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY, Plastics Division,
Dept. FP3, Springfield 2, Mass.

Please send me information on:

☐ Resinox phenolic resins for core bonding.
☐ Resinox Production Information Bulletin No. 61 on the "C" Process.

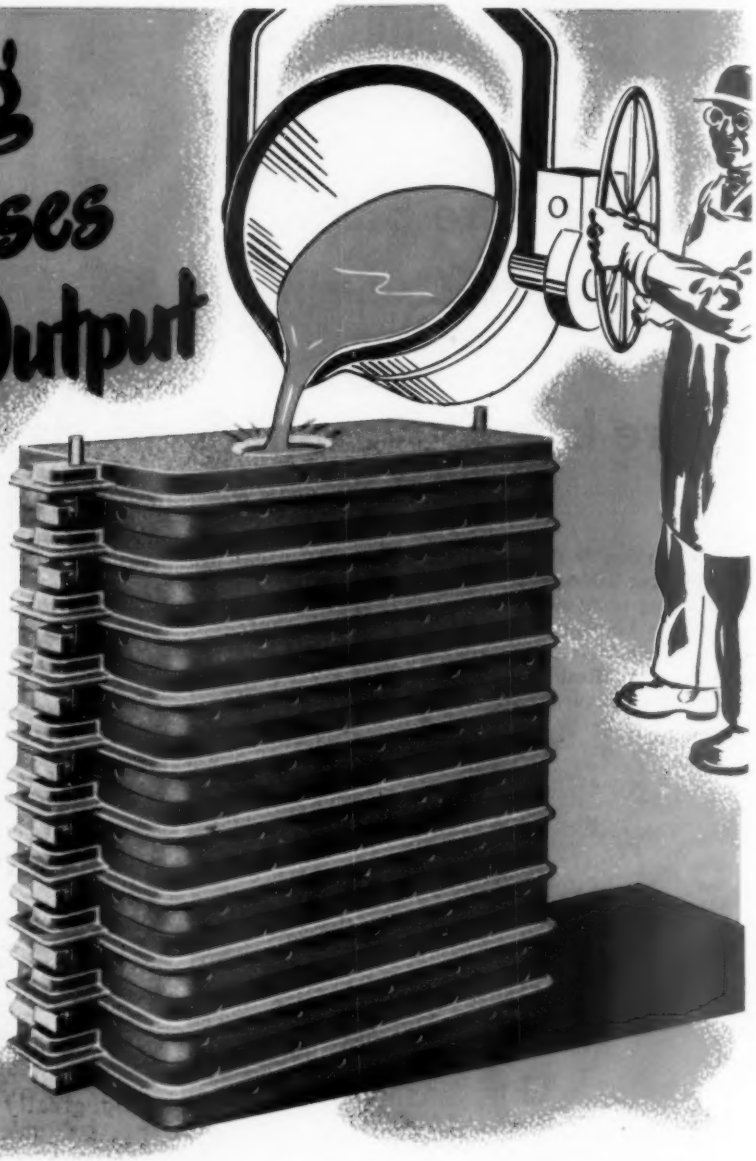
Name & Title _____

Company _____

Address _____

City, Zone, State _____

Stack Molding Greatly Increases Your Casting Output



You want to modernize your foundry and step up casting production! Then be sure to investigate Sterling stack molding technique. It enables you to pour ten, or even twelve, sections at a time.

In stack molding, the molds are made in flask sections stacked one above another to a height of 10 or 12 sections. A common sprue through the stack feeds the molten metal to runners leading to individual casting cavities. The increased amount of hot metal in relation to the total flask volume generates tremendous heat with a corresponding increase in gas pressure. That's why —

Sterling Steel Flasks should be used for stack molding. They are ruggedly constructed of special rolled steel to withstand terrific pressures. A reinforcing rib around the side prevents distortion and misalignment of the stacked molds. Successfully job-tested in high production foundries over a period of years. Consult Sterling for your flask requirements. Write for new Catalog No. 60 just off the press.

STERLING WHEELBARROW CO.
MILWAUKEE 14, WISCONSIN, U. S. A.

A 5692-1P-C

Castings Should Be in Separate NPA Division

THE Defense Act of 1950, which became a law on Sept. 8, gives the President sweeping powers, including the authority to allocate materials and facilities, to requisition equipment or supplies, and to stimulate expansion of productive capacity for the manufacture of war materials. Responsibility for administering priorities, allocations and inventory controls has been given to the Department of Commerce, and the National Production Authority has been established by the Secretary of Commerce as the operating agency.

NPA has made considerable progress in setting up an organization, which includes a number of commodity divisions to handle controls of certain materials basic to the defense program. A few industry advisory committees have been appointed, and attention is being given to many others. In contrast to the general attitude which prevailed during World War II, trade association executives are being called upon for advice in the development of the NPA organization and program.

Under the present NPA plan, the problems of the foundry industry pertaining to priorities, allocations and inventory controls will be divided among several commodity divisions. Gray iron, malleable iron and steel castings are to be administered in the basic iron and steel division under Frank T. McCue. Brass and bronze castings will be in the copper division and aluminum and magnesium castings in the light metals division under Frank H. Hayes. Foundry equipment and supplies are scheduled for the machinery and equipment division under William L. Beck. All of these men have long experience in the problems of the basic materials handled by their respective divisions, and have shown interest in providing an organization for the individual foundry branches.

While foundrymen appreciate greatly the sympathetic approach and cooperative attitude of these men, the feeling is prevalent among leaders of the industry that top policy planners in NPA are repeating World War II mistakes with regard to the foundry industry. Ferrous foundries have nothing in common with the basic steel industry, outside of the fact both melt ferrous metals. The problems of brass and bronze foundries are not similar to those of refiners of copper, and a similar situation is found in connection with foundries making aluminum and magnesium castings.

From the standpoint of the size of the industry, tonnage of castings produced, basic character of the product in all engineering construction, and the importance of castings in any defense emergency program, the foundry industry should be accorded the status of a commodity division where all of the procurement, production and allocation problems of the producers of castings could be handled under a single organization.

The defense program in NPA needs a castings division which will be on a par with basic iron and steel, copper, light metals, forest products, and others. Only through such an organization can foundries render maximum service to the nation in this emergency.

Frank G. Steinebach

Editor

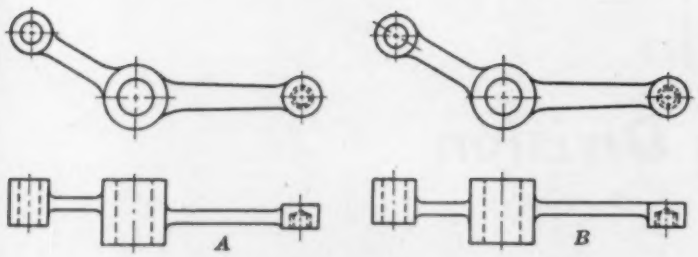
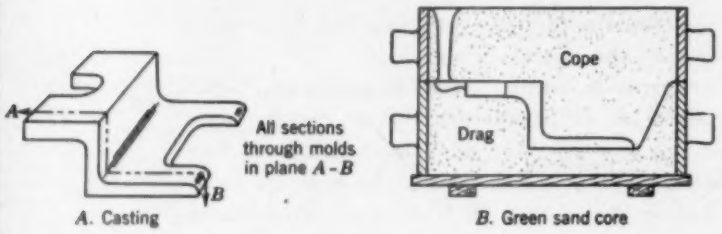


Fig. 1—*A*: Casting designed with an irregular parting. *B*: Casting redesigned with straight parting



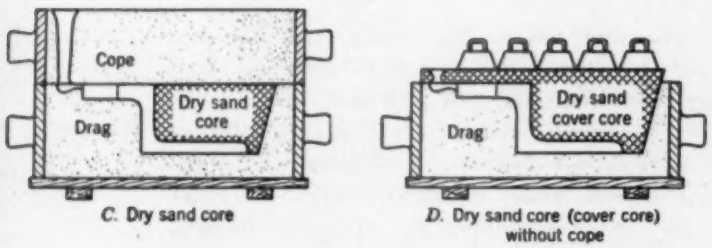


Fig. 2—Various methods of molding a casting

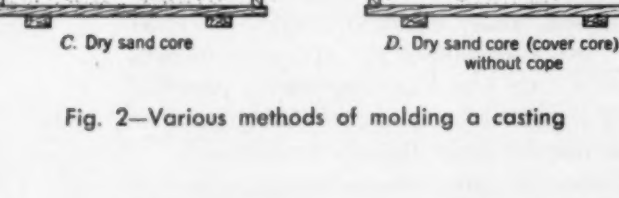


Fig. 3—Redesign to eliminate a dry sand core

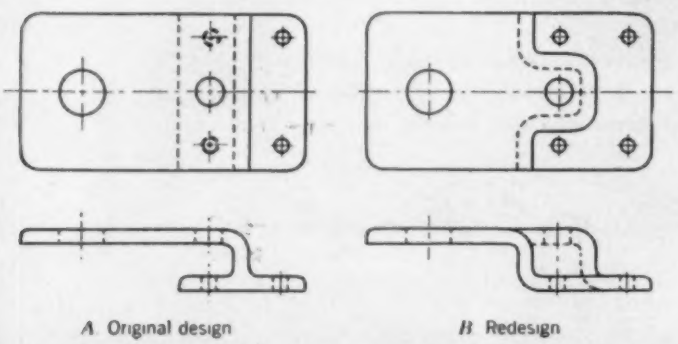


Fig. 4—Another redesign to eliminate a core

Casting D

FOR ECONOMICAL M

IN DESIGNING a casting, the responsibility of the engineer goes beyond proper function and service. Economy of production is usually a very important factor, and consideration of molding procedures should be constantly incorporated in the development of the design.

Variations in foundry procedures and in the form and construction of patterns and coreboxes should be thoroughly investigated to insure the most economical plan for producing castings of specified quality. Furthermore, operations other than those of the pattern shop and foundry must be considered, and the design of the casting and pattern equipment should be such that the cost of all other operations is reduced to the minimum. Such operations may include finishing, or the elimination of finishing where possible, in whole or in part; assembly of this part to other parts; and economical servicing during the useful life of the casting. When a casting is to be produced in large numbers, the final plan of production is determined only after many changes and alterations have been made. During such developments much apparatus is rendered obsolete, with consequent monetary loss, but the production of greater quantities of castings assures an overall gain.

Irregular Parting Changed to Straight Parting—The engineer should strive to design castings with parting planes that are straight or as nearly straight as possible. Fig. 1*A* shows a casting to be molded on an irregular parting. With proper consideration for production cost, it might be redesigned as illustrated in Fig. 1*B* and molded on a straight parting. The portions of the hubs projecting above the parting plane at the center of the casting and the end of one arm are loose pattern parts and are assembled to the main pattern with dowel pins.

When an irregular parting results in a deep mold pocket, it may be more economical to redesign the pattern equipment and change to a molding method with a straight parting involving the use of cores. Fig. 2*A* illustrates a casting to be molded with a deep sand pocket. To prevent a drop-out when the cope is drawn, gaggers may be needed to reinforce the sand projection of the deep pocket. Considerable difficulty may be encountered by the molder in rolling over the mold if a follow board is employed. By this method a jobbing molder is able to make relatively few molds per day, and losses due to defects may be quite large. Fig. 2*C* shows how a core may

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gDesign
AL MOLDING

Influence of a casting's design on its method of production is discussed by the author in this chapter from his new book, Fundamentals in the Production and Design of Castings. It is reproduced by permission of the publisher, John Wiley & Sons Inc., New York

be designed to replace the green sand projection. A core print on the new pattern eliminates the deep pocket and changes the parting to a straight line. The simple parting makes it possible to attach the pattern to a drag molding board which may be installed on a roll-over machine, the net result being many more molds per day with little loss in defective castings. The advantage gained in the new molding process justifies the additional cost of making and baking cores. To avoid the use of two machines (one for copes and the other for drags), the dry sand core may be designed as a cover core, as shown in Fig. 2*D*, and no cope is necessary.

Redesign to Eliminate Cores—Frequently, a slight change in casting design may improve the cost of production by eliminating cores. Fig. 3 shows an original design (*A*) which required a core to form the interior of a casting. With redesign of the casting, as *B*, a green sand core was substituted for the dry sand core. Such a change in design may alter the parting from straight to irregular, and the cope may contain either a cavity or a hanging sand pocket. If the casting is relatively small and the pocket is not too deep, no gaggers are necessary to support the sand.

In Fig. 4*A*, cores were required to form the pocket made by the two flanges, parallel and opposite each other. The redesigned casting not only eliminated the core but made the bolt holes more accessible.

Redesign to Avoid Loose Pattern Parts—Bosses are frequently used to increase the sectional thickness of housings in order to provide longer bolt or tap holes or to improve the strength of certain parts of the casting. This may be done satisfactorily if the axis of the cylindrical boss is parallel to the direction in which the pattern is drawn out of the mold. When this condition does not exist, the boss on the pattern must be loose, and the skilled technique of

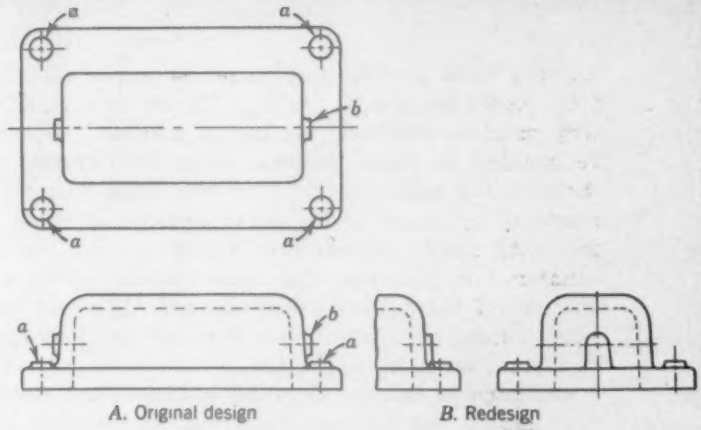


Fig. 5—Design to avoid loose pattern parts

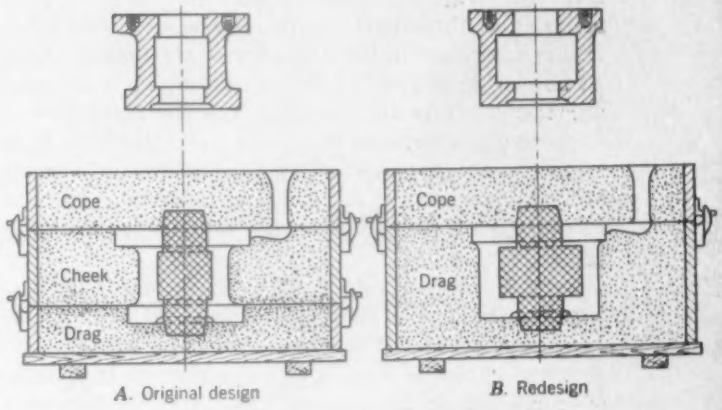


Fig. 6—Redesign to change mold production from a three-part mold to a two-part mold

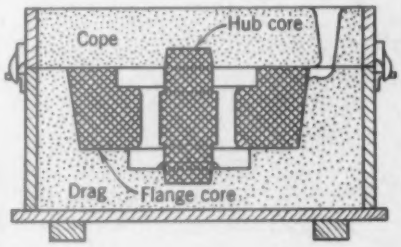


Fig. 7—Changing mold production from a three-part mold to a two-part mold with use of cores

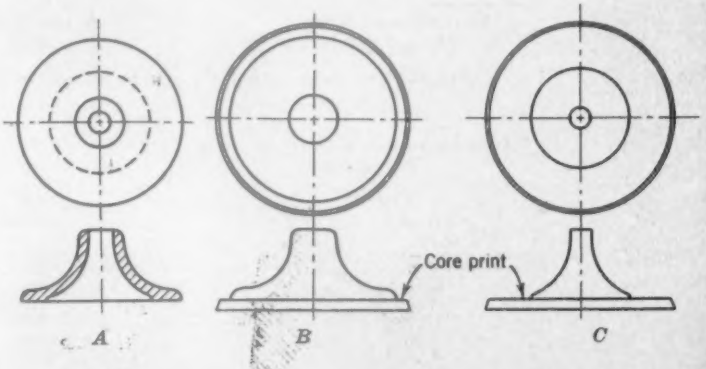


Fig. 8—Pattern and core for the production of a lamp base casting. *A*: Lamp base casting. *B*: Lamp base pattern. *C*: Lamp base core

molding loose pattern parts must be employed. The four bosses marked "a" in Fig. 5*A* are in a satisfactory molding position, but bosses marked "b" must be molded as loose pattern parts and drawn out through the mold cavity after the main pattern is removed. Because of the small amount of space in the mold cavity, considerable difficulty would be encountered in removing the loose pattern parts, and the cost of the casting would be high. If a pad were used instead of a boss, as in Fig. 5*B*, the loose pattern parts would be eliminated.

Redesign of Casting to Avoid a Three-Part Mold—The smaller the number of partings in the mold, the less work required to make the mold. Not only is the pattern equipment less complicated in a two-part mold, but it can be adapted more readily to machine molding. Fig. 6*A* shows a sectional view of a hub made in a three-part mold. If the diameter of the hub is increased to the diameter of the smaller flange, as shown in Fig. 6*B*, a three-part mold is no longer necessary. Only the designer has the right to make such changes because he is the only one who knows how the change would affect the function of the casting. Consequently, it is his responsibility as an efficient engineer to consider the molding process carefully.

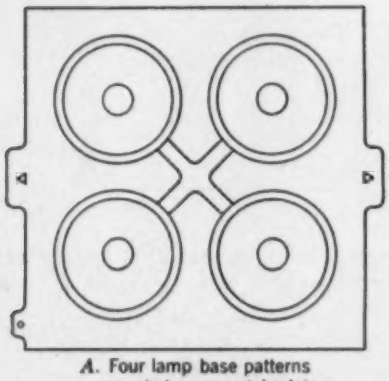
Core Used to Avoid a Three-Part Mold—If at all possible, proper design is the best way to avoid a three-part mold. When this cannot be accomplished, the next choice of simplifying the process is by means of cores which incorporate the parts of the design that obstruct pattern draw. A core may be made in several parts and assembled by pasting the parts together, or the parts may be set in the mold individually. Fig. 7 shows a hub as originally designed, and molded with a dry sand core in a two-part mold.

Selection of Production Method—In the production of the lamp base casting illustrated in Fig. 8, at a rate of 1000 per month, four patterns were mounted on a match plate and molded in a tapered flask, as illustrated in Fig. 9. To insure a smooth surface free of defects, the face of the casting was molded down in the drag and a cover core was used to form its interior.

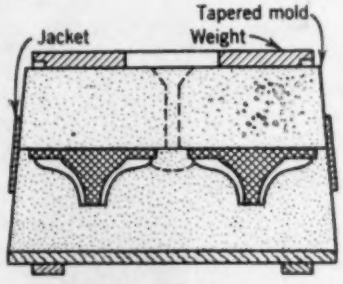
Although this was a satisfactory casting procedure, it was decided to investigate other methods, with the possibility of reducing the cost of production. In his study to improve the production method, the production engineer considered the following possibilities:

1. Dry sand mold without a cope, with a dry sand core, Fig. 11.
2. Green sand mold without a cope, with a dry sand core, Fig. 12.
3. Permanent mold with a dry sand core, Fig. 10.
4. Die casting.

Die casting was immediately eliminated because the initial cost of the die and equipment was too high for the relatively small number of required castings. However, a permanent mold with a dry sand core deserved careful consideration. No ejector would be necessary, as with a metal core in die casting. Not only would a permanent mold eliminate the labor of making molds, but the castings would be smoother because of a fine grain structure resulting from a chilled surface. Cost of the mold would not be excessive because of the simplicity of the design. It



A. Four lamp base patterns mounted on a match plate



B. Completed mold of four lamp base cavities

Fig. 9—Production of lamp base castings by conventional method

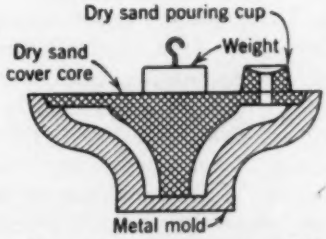


Fig. 10 — Permanent mold with a dry sand core

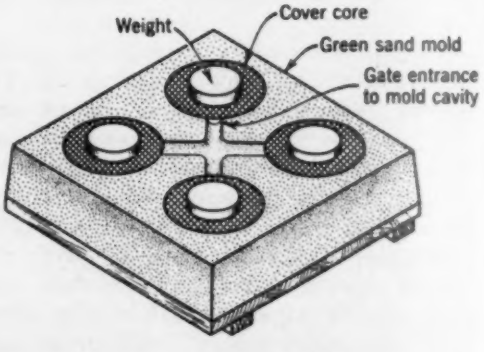


Fig. 13—Production of casting without use of cope or jacket

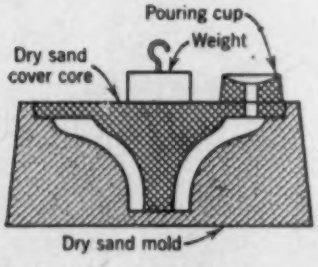


Fig. 11 — Lamp base in a dry sand mold

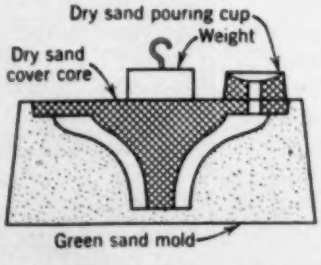


Fig. 12—Lamp base in a green sand mold

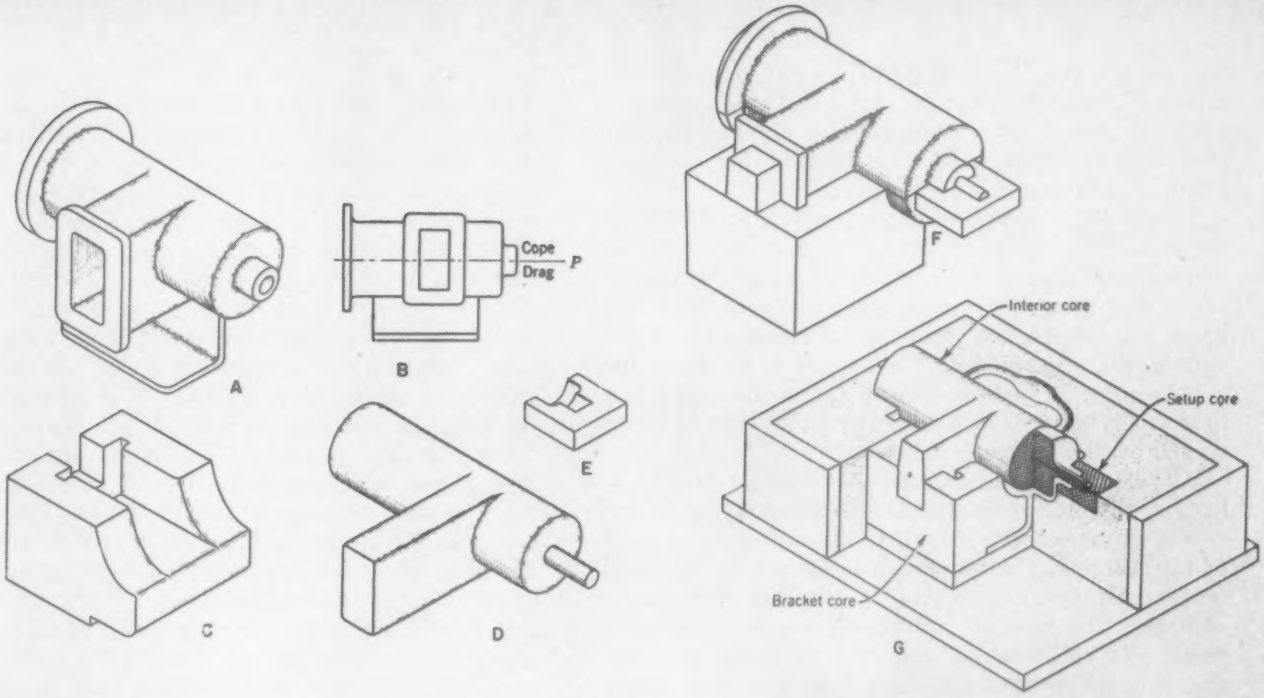


Fig. 14—*A*: Casting. *B*: Parting plane. *C*: Core to form part of casting and to support center core. *D*: Center core. *E*: Setup core. *F*: Pattern. *G*: Sectional view of completed drag

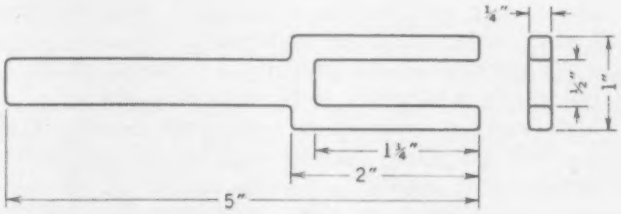


Fig. 15—Flat forked shape, number 1

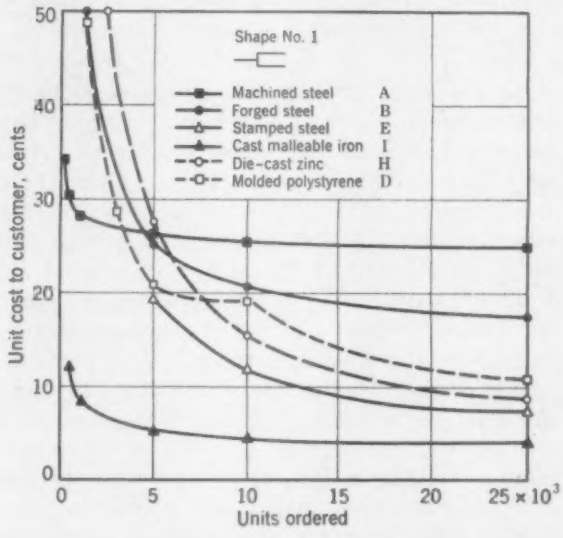
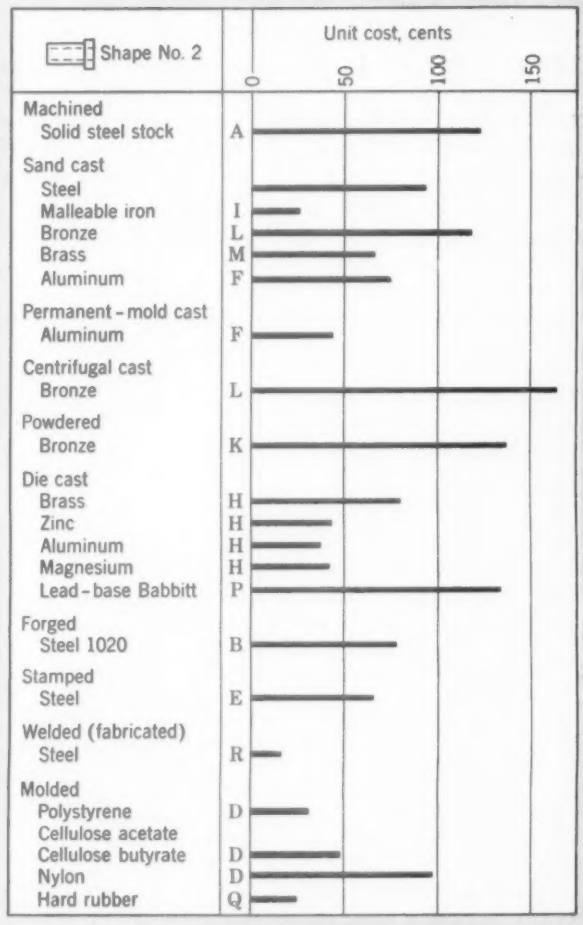


Fig. 16—Comparison of unit costs of shape made by several materials-method combinations. Costs quoted by companies A,B,E,I,H, and D, respectively, for orders up to 25,000 units. (This chart and those of Figs. 17 and 18 courtesy of Walter Bergren, Master's Thesis, Purdue University)



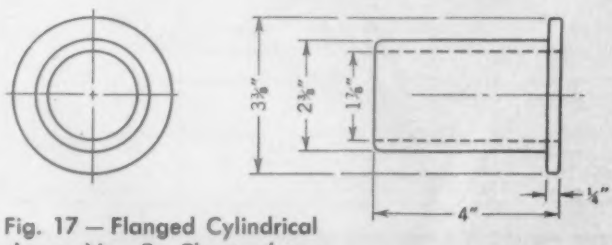


Fig. 17 — Flanged Cylindrical shape No. 2. Chart above compares cost of making it by different methods

was not difficult to see that the permanent mold was a better choice than the dry sand mold, not only because it reduced the labor cost of coremaking but also because it required less expense for core ingredients and heat energy in baking.

With a bit of experimentation, it was found that a green sand mold, as illustrated in Fig. 12, could be successfully poured without any supporting jacket. When the permanent mold was compared with the green sand mold, the latter method seemed less advantageous because a new mold had to be made for each casting. However, this might be an advantage, in that any number of green sand molds may be made up and poured at convenience.

Considering the advantage of producing four castings by the original matchplate method of Fig. 9, and the advantage of the cover core in a green sand mold of Fig. 12, it was believed that the two methods could be successfully co-ordinated to gain the advantages of both. The original matchplate was mounted on a small jolt roll-over pattern-draw molding machine, and only the drag of a tapered flask was used. Cover cores were placed in the mold cavities, and weights were placed on each of the four cores. The gate was improved slightly to avoid sand erosion. On the basis of previous experience with the method of Fig. 12, no jackets were employed. The molten metal was poured directly into the gate. Efficiency was further improved with the use of a shallow flask (Fig. 13) to reduce the amount of sand per mold. Thus, the monthly requirement was produced with a total of 250 green sand drag molds and dry sand cores.

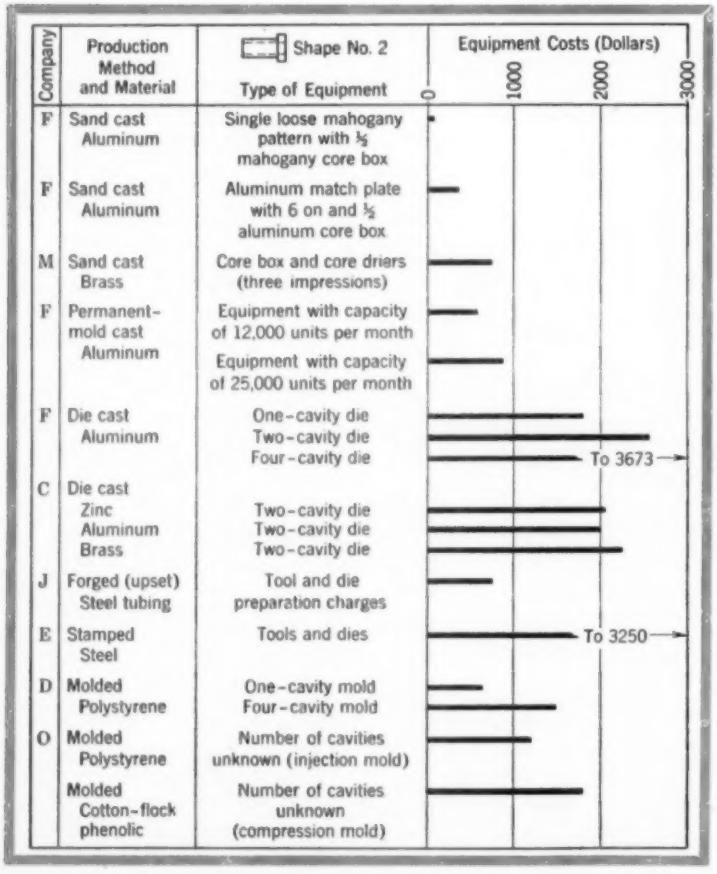


Fig. 18—Comparison of tool and die costs for manufacturing shape shown in Fig. 17

Effect of Quantity on Production Cost—After determining the various engineering requirements desired in a casting, the engineer must then consider the type of material to be used and the method to be employed in the production of the part. The number of castings of a given design is an important factor in determining the material and method. To illustrate this, the simple design of Fig. 15 was selected and quotations were asked from various reliable concerns for the production of the casting in quantities from 100 to 25,000. It is apparent from the graph in Fig. 16 that methods employing dies and other expensive production equipment are excessively high for smaller quantities, but in larger quantities they become increasingly competitive. Die casting, for example, is among the most costly of production methods for quantities of 2500, but for quantities of 25,000 it is in close competition with stamped steel, and for larger quantities it is quite possible that it would be least expensive. Frequently a die casting may cost more than an unfinished sand casting, but, because of the close tolerances obtained in die casting, the finished sand cast product may be more expensive.

The design of Fig. 17 was investigated in the same manner, and the results are shown graphically above Fig. 17. It should be emphasized that the graph shows unit cost to the customer, based on a customer's order of 10,000 units. Fig. 18 shows graphically the cost of the equipment in the production of the shape described. It is clear that, owing to the high cost of production equipment, some of the methods are priced entirely too high for the quantity required. It should be kept in mind that other considerations relating to function, endurance and appearance may eliminate a less expensive process.

Choosing the Parting Plane—Careful consideration should be given to all parting possibilities in order to make best choice for a given design. The principal objectives in the selection are (1) to produce castings as economically as possible and (2) to avoid defects.

As a general rule, it is more desirable to have all or the greater portion of the mold cavity in the drag, because it is easier to draw the pattern from the drag than to lift the cope off the pattern. Hanging sand projections and slender mold sections in the cope are more likely to drop out unless they are properly reinforced with gaggers, nails and specially designed flask bars. All these problems may often be avoided by proper choice of parting plane.

It is usually preferable to choose a parting which avoids a deep drag in order to reduce the weight of the mold and the labor of ramming excess sand. Reduction in weight of the cope is even more important than reduction in weight of the drag because the cope requires more handling. Consideration should also be given to other arrangements of the patterns in the parting plane in order to utilize all the useful space on the parting surface. It is usually preferable to arrange the casting so that its thickest sections appear in the parting plane so that the casting may be fed more effectively. It (*Please turn to page* 248)

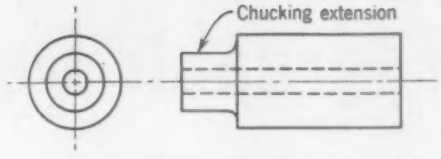


Fig. 19—Chucking extension facilitates machining entire casting without removing it from chuck

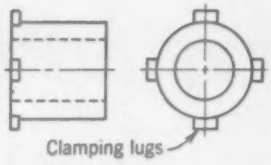
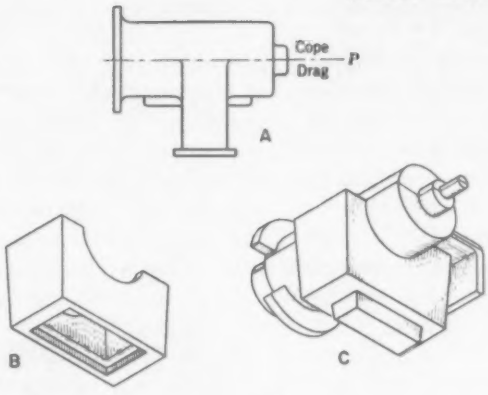


Fig. 20—These lugs aid clamping when casting is machined



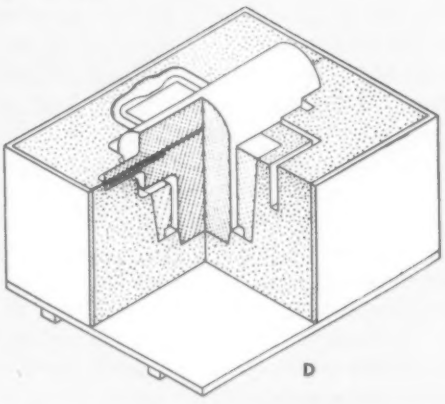


Fig. 21—*A*: Parting plane. *B*: Core. *C*: Pattern. *D*: Sectional view of completed drag

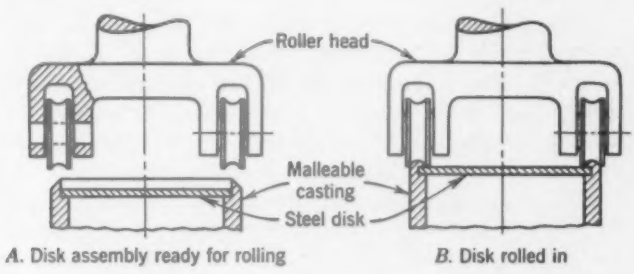


Fig. 22—Assembly by rolling

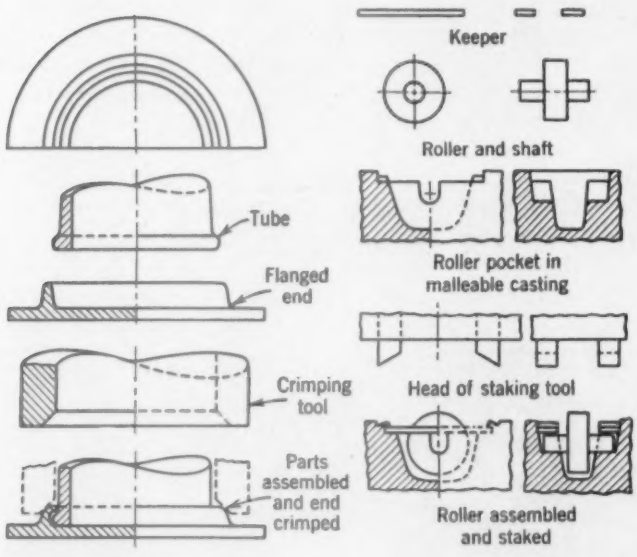


Fig. 26 — Assembly by crimping

Fig. 27—Assembly by staking

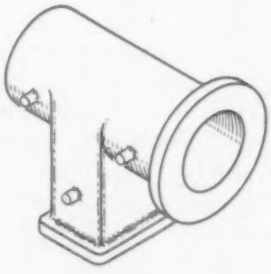


Fig. 23—Redesign to eliminate core

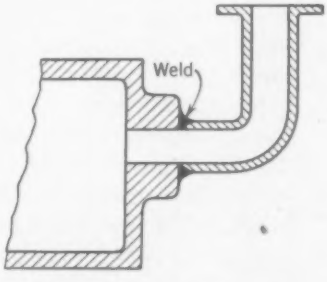
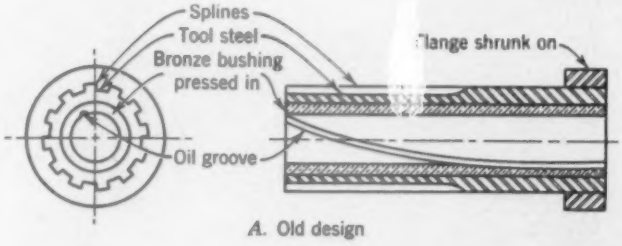


Fig. 24—Cast-weld construction. Elbow made of acid-resistant steel



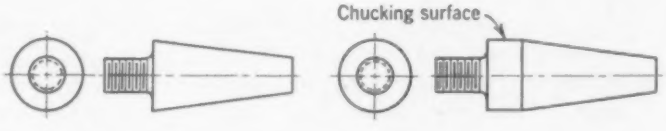


Fig. 25—Casting redesigned to aid chucking

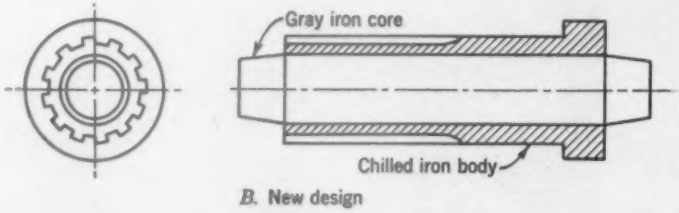


Fig. 28—Evolution of design

Rapid Polarographic Determination

OF ZINC IN COPPER-BASE ALLOYS

IN the analysis of copper-base alloys zinc is usually reported by difference. Such a practice is fairly safe for those alloys where the amount of zinc present is in the order of a few per cent. However, in many alloys the amount of zinc permitted is less than 1 per cent. In such cases, small errors in the determination of the other elements may be a cause for metal being rejected or accepted unjustly.

The standard chemical procedures available,[1] call for a number of separations, are long, and take skill to obtain accurate results. Now that the polarograph is readily available, this laboratory has investigated the possibility of using this instrument for the determination of smaller amounts of zinc in brass and bronze. Although Lingane[2] has recently proposed a procedure for the polarographic determination of zinc in copper-base alloys, special controlled potential equipment is needed prior to the polarographic determination, and the procedure is too long to be used for furnace control work.

Since the half wave potential of zinc is around 1 volt, consideration must be given to the possible interference of copper, tin, lead, iron, antimony and nickel when present in much larger quantities than the zinc. Attempts to mask the copper wave without affecting the zinc wave failed. The problem was then to find a rapid method for separating the copper from the zinc.

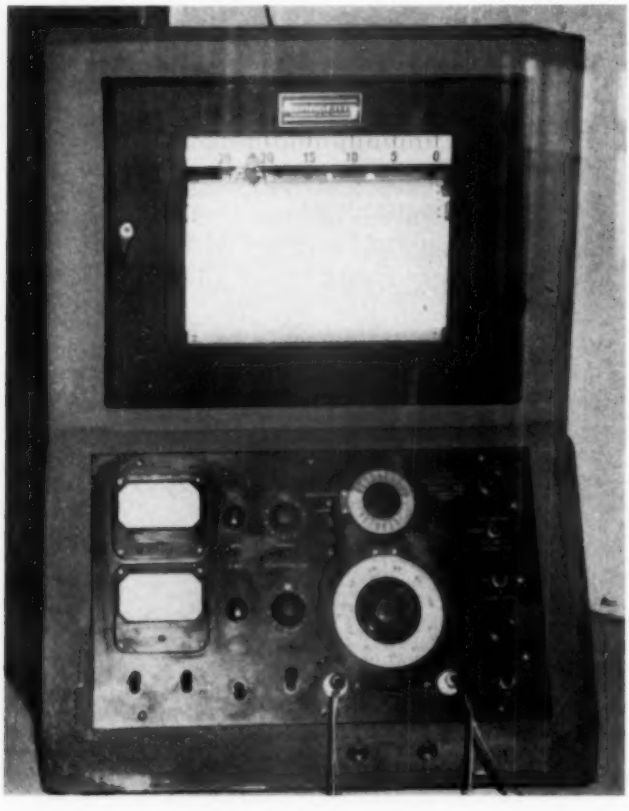


Fig. 1—Visible recording polarograph with a polarogram of U.S.B.S. 63a was used in making the experiments

Plating in nitric acid solution did not prove feasible. The separation took too long and we were unable to obtain consistent results as long as there were nitrates present in the polarographic cell. A more successful method was plating in perchloric acid solution. The sample was dissolved in a mixture of hydrobromic acid and bromine and taken to strong fumes with perchloric acid. Copper and lead were plated out in a volume of 75 ml using 8 amp and very rapid stirring. Under these conditions 0.3-gram copper would plate out in 4 minutes. Lead plates on both the anode and cathode. A polarogram was run on a portion of the electrolyte in an ammonium chloride-ammonium hydroxide buffer containing gelatin. This method failed when the lead content of the alloy was over 4 per cent, since the spongy lead plate would absorb zinc.

The most suitable method for the separation of copper was found to be by the method of Soderbaum[3, 4] using acetylene. In an ammoniacal citrate solution, copper which has been reduced with hydroxylamine hydrochloride is precipitated by acetylene as copper acetylide. This method proved to be very rapid, quantitative and placed the solution in the proper condition for direct polarographic determination. A determination can easily be completed in well under 20 minutes with an accuracy comparable to that of the best umpire methods.

The work in this laboratory was done with a Sargent Model XXI visible recording polarograph. Fig. 1 shows the polarograph with a polarogram of U.S.B.S. 63a. Fig. 2 shows the cell assembly and nitrogen tank.

Solutions—Gelatin—To 700 ml water add 25 ml concentrated hydrochloric acid and raise to a boil. Add 3.5 grams pearl hide glue and continue to heat with occasional stirring until the glue is completely decomposed. Cool to room temperature.

Base solution—To the cool gelatin solution add 20 grams hydroxylamine hydrochloride, 100 ml 25 per cent citric acid and 260 ml ammonium hydroxide. Add a milligram or two of thymol for a preservative and keep in a stoppered bottle. The solution is stable for about a week.

Procedure:

1. Transfer 0.2000-gram borings to a 100-ml volumetric flask and dissolve with 2 ml concentrated hydrochloric acid and 3 ml 30 per cent hydrogen peroxide. With over 10 per cent lead alloys a little more peroxide may be needed to complete solution. After solution is complete, boil 60-90 seconds to destroy excess peroxide.
2. Add 15 ml cold water followed by 50 ml base solution.
3. Mix and place on the hot plate for 30 seconds.

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The solution will be colored a very pale blue.

4. Remove from the heat and gas with a brisk stream of acetylene for two minutes.

5. Cool to room temperature, dilute to the mark with water, mix up and pass a portion of the solution through filter paper containing pulp. Catch about 15 ml in a dry beaker for the polarographic cell.

6. Pass nitrogen through the solution for 2-3 minutes and run a polarogram from about 0.7 to 1.25 volts. A sensitivity of 0.04 microamps per millimeter may be used for the range of 0.25 to 3.0 per cent zinc. Calibrate by running through samples of known zinc content.

Discussion—Some difficulty was encountered in finding a proper gelatin. The pearl hide glue obtained from Swift & Co. proved to give the best results. Using lesser amounts of the suppressor than recommended yields maxima and inconsistent results. Whatever suppressor is used, tests should be run to determine its optimum concentration.

Under the conditions of the determination, tin, lead, iron and antimony do not yield waves and have no effect on the zinc. Nickel in the amounts usually found in these alloys does not yield a wave. However, when present in the amount of over 1 per cent, the beginning of the zinc step is flattened out and some difficulty is encountered in measuring the step. This is especially true when zinc is less than 0.25 per cent. To overcome this difficulty, a small pinch of solid dimethylglyoxime is added to the solution before passing in the nitrogen and the bulk of the nickel will be precipitated during the gassing operation. The addition of dimethylglyoxime as a solution either in alcohol or sodium hydroxide had a distorting effect on the zinc wave.

For zinc less than about 0.15 per cent a 0.5-gram sample should be used. The hydrochloric acid for dissolving the sample is increased to 3 ml and the hydrogen peroxide to 6 ml. No added time is needed for the acetylene treatment. Phosphorus in rather large quantities will cause low results. Each 0.10 per cent phosphorus will lower the zinc approximately 0.02 per cent. For this reason it is better to calibrate with the use of U.S.B.S. 52b rather than 63b. For lower ranges of zinc pure zinc may be added to 0.2-gram portions of pure copper.

Table I shows the results obtainable by this method. No attempts were made to determine zinc over 3.0 per cent. Standards 63a and 63b were corrected for phosphorus content.

Tests are now in progress for possible application to aluminum alloys.

TABLE I—Polarographic Method Results

Sample	Zinc Present	Zinc Found
62a	0.61	0.61 0.62 0.62
62b	0.71	0.69 0.70 0.70
52b	2.96	2.98 3.00 2.97
A*	0.17	0.16 0.17 0.16
B*	0.23	0.23 0.23 0.23

* Determined by ASTM method. Average of three runs.

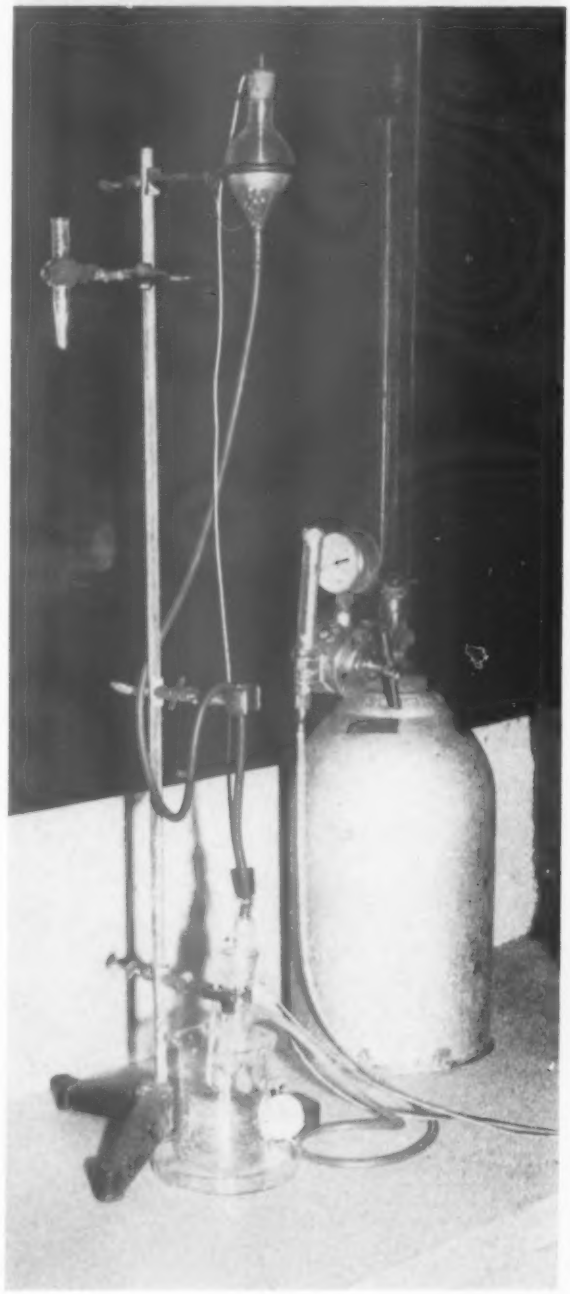

Fig. 2—Cell assembly and nitrogen tank used in preparation of ammoniacal citrate solution for the tests

References

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2. Lingane, J. J., *Industrial and Engineering Chemistry*, Analytical Edition, 18.429 (1946).
3. Soderbaum, H. G., Ber. 30.760.814 (1897).
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Nodular Iron E

BEFORE beginning an experiment in nodular iron at Gunite Foundries Corp., the question of base iron to be used arose. If the recommended base iron (high silicon, low manganese, and low phosphorus) was to be made, special heats would have been necessary, with unavoidable disruption of plant operations. Consequently, it was decided to first determine the properties obtainable by producing nodular iron using the regular production base irons. This article deals first with cupola iron experiments, and second with a 5400-lb heat of nodular iron made in an electric furnace.

TABLE I—Cupola Base Irons

	Type A	Type B
Total carbon	3.30%	3.55%
Silicon	1.80	1.60
Manganese	.65	.70
Phosphorus	.14	.14
Sulphur	.14	.14
Copper	.20	.20
Nickel	.10	.10
Chromium	.10	.10
Molybdenum	.10	.10

Table I shows the approximate cupola base iron compositions which were available as regular production.

In a few preliminary experiments, the Type A base iron was treated in hand ladles holding 40 lb of metal. The first successful experiment (successful only from the standpoint of having nodules present) produced a microstructure shown in Fig. 1. The large amount of massive cementite, due to the high magnesium content (0.19 per cent), will be noted. Because of excessive temperature losses encountered when such small amounts of metal were treated, it

TABLE II—Properties of Cupola Nodular Iron Treated in 250-lb Batches Using 80-20 Ni-Mg Alloy

Experiment No.*	Initial Ferro-Silicon (85% Si) Addition, %	Sodium Carbonate Addition, Lb	Time of Contact, Min	% Mg Added	% SMZ Added	Final % S	Final % Mg	Mg Recovery, %	Heat Treatment	Tensile Strength, psi	Yield Point, psi	Elong, % in 2"	Red. in Area, %	Bhn	1.2" Diam Bar, 18" Between Supports: Transverse Str, Lb**	1.2" Diam Bar, 18" Between Supports: Deflection, In.
13-A	None	6	4	.32	.80	.033	.066	21	as cast	98500	.....	1	None	311		
									3 hr 1650° F; annealed	92600	69900	2	...	302[a]		
									3 hr 1650° F; annealed	123600	.....	2½	...	302		
									Periodic malleable oven anneal	76800	51800	16½	12.3	183		
14-A	.90	6	4	.32	.60	.025	.048	15	as cast	100540	71080	½	None	302[b]	5900	.38
									as cast	86700	65300	1	None	302[c]		
									as cast	98200	72200	2	1.6	285		
									3 hr 1650° F; annealed	98200	66250	4½	4.3	255		
									Periodic malleable oven anneal	72500	52100	19½	16.6	174		
23-A	.90	8	4	.28	.60	.033	.048	17	as cast	85500	.....	1½	None	269	6620	.56
									3 hr 1650° F; annealed	94300	60200	1½	None	285		
									2 hr 1600° F; annealed	73000	.....	4	1.6	207[d]		
24-B	1.20	8	4	.28	.20	.031	.063	22	as cast	82900	.....	1½	None	302[e]	6920	.50
									as cast	85800	.....	2	None	285		
									3 hr 1650° F; annealed	111000	89500	1½	None	321		
									2 hr 1600° F; annealed	93100	.....	5	3.2	229[f]		
34-B	1.20	10	5	.26	.47	.020	.071	27	as cast	85200	66500	1½	0.4	285		
									3 hr 1650° F; annealed	99700	68200	7	4.7	241		
35-A	1.60	10	4	.28	.50	.017	.067	25	3 hr 1650° F; annealed	96300	70500	3½	1.6	248		
36-B	1.15	10	4	.27	.20	.023	.059	22	as cast	88400	67600	1½	0.4	262	6400	.48
									3 hr 1650° F; annealed	74900	44900	8	5.5	192[g]		
37-B	1.11	10	4	.26	.20	.015	.062	24	as cast	91900	62500	2	1.2	269	6640	.50
									3 hr 1650° F; annealed	77700	45300	9	6.6	192		
38-B	1.00	20	4	.22	None	.019	.095	43	as cast	94100	69700	3	1.2	262[h]	5900	.46
									3 hr 1650° F; annealed	120000	.....	3	1.9	293[h]		
39-B	1.20	10	4	.28	.20	.019	.071	25	as cast	87800	56500	2	0.8	285	5720	.30
									3 hr 1650° F; annealed	105200	.....	2	1.2	302		
				.28	None	...	.10	36	as cast	85400	.....	1½	0.5	285[i]	6610	.50
									3 hr 1650° F; annealed	89400	52800	9	5.8	217[i]		
40-B	1.20	10	3													
				.28	.40	...	.10	36	as cast	85200	.....	2½	1.5	241[j]		
									3 hr 1650° F; annealed	87000	54500	14½	11.2	207[j]		
42-B	1.20	8	3	.28	.20	.023	.049	18	as cast	90000	70100	2	0.8	255	6550	.40
									3 hr 1650° F; annealed	88600	.....	7	4.7	197		
43-B	1.20	8	2	.30	.20	.024	.068	23	as cast	86400	57000	2	0.8	269		
									3 hr 1650° F; annealed	86600	.....	5	2.7	217		
44-B	1.20	8	3	.28	.20	.024	.053	19	as cast	83900	68700	2	0.4	269		
									3 hr 1650° F; annealed	95000	75000	5	2.4	235		
45-B	1.20	8	3	.32	.20	.029	.060	19	as cast	85900	54000	2	None	269		
									3 hr 1650° F; annealed	98300	.....	4	2.7	255		

All test bars were .505" diameter and from keel block legs, unless otherwise stated. * Indicates type of base iron, from Table I. ** All transverse bars in as-cast condition.

(a)—Machined from 1.2-in. diam bar. (b)—.800-in. diam test bar machined from 1.2-in. bar. (c)—.505-in. diam test bar machined from 1.2-in. bar. (d)—Slower cooling rate than bar immediately above. (e)—From 1.2-in. diam bar. (f)—Slower cooling rate than bar immediately above. (g)—Cut from body of keel block. (h)—Metal cold. (i)—Prior to SMZ addition. Metal cold. (j)—After SMZ addition. Metal cold.

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Experiments

was decided to work with batches of 250 lbs.

The following magnesium alloys were used in the course of the experiments: 80-20 nickel-magnesium, 50-50 nickel-magnesium, 80-20 copper-magnesium, 70-30 copper-magnesium, 34-7 silicon-magnesium (balance mainly iron) 43-9 silicon-magnesium (balance mainly iron).

The results will be discussed according to magnesium alloy used.

80-20 NI-MG—This alloy gave results far superior in consistency to any of the others used. The gen-

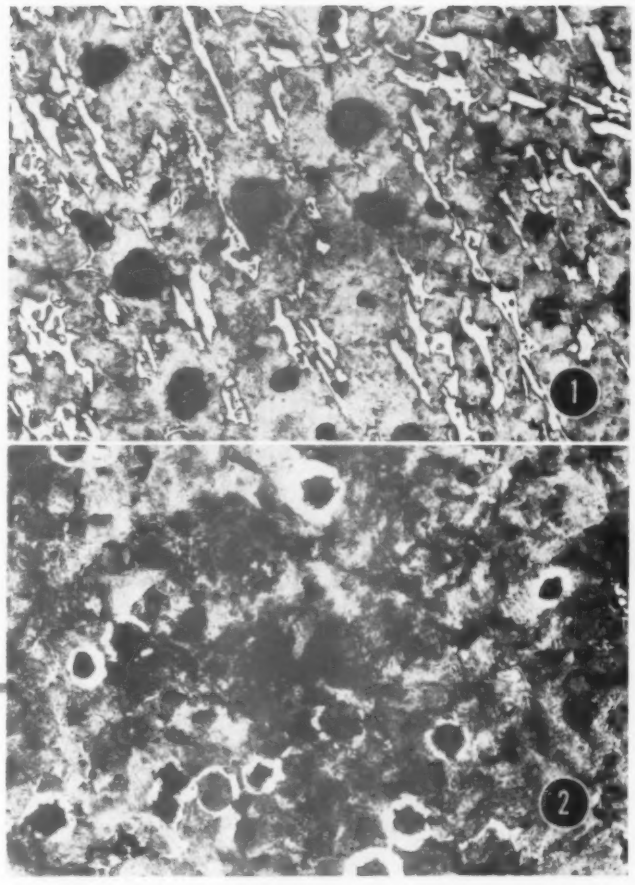


Fig. 1—Showing effect of excessive Mg content (0.19 per cent) on microstructure. 1.2-in.-diameter bar, as cast. Graphite nodules in matrix of pearlite and massive cementite. X100, picral etch.

Fig. 2—Experiment 14-A. Typical microstructure of as-cast cupola nodular iron. Approximately 10 per cent free ferrite in matrix of pearlite. Tensile strength 98,200 psi; yield point 72,000 psi

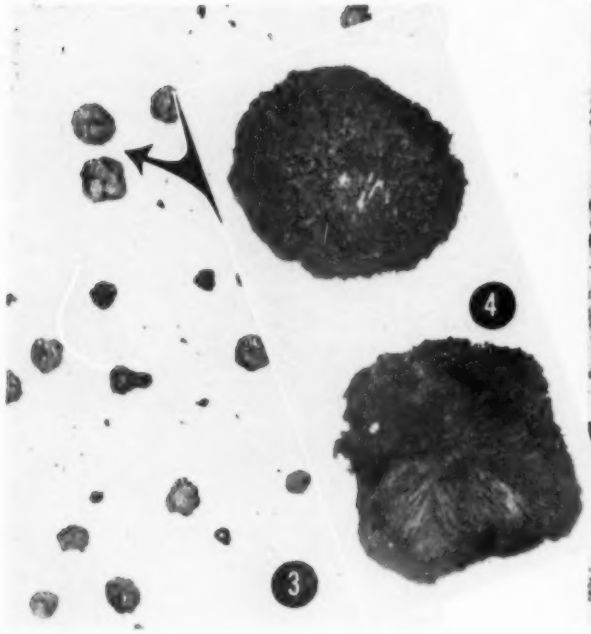
TABLE III—Chemical Compositions of Cupola Nodular Irons Listed in Table II

Experiment No.	% Total Carbon	% Silicon	% Manganese	% Phosphorus	% Sulphur
13-A	3.27	2.20	.69	..	.033
14-A	...	2.70	.69	..	.025
23-A	3.28	2.50	.45	..	.033
24-B	...	2.47	.58	.13	.031
34-B	3.38	2.66	.59	..	.020
35-A	3.25	...	.66	..	.017
36-B	3.52	2.50	.61	.14	.023
37-B	3.41	2.30	.65	..	.015
38-B	3.50	...	.80	..	.019
39-B	3.46	2.53	.76	.14	.019
40-B	Not determined				
42-B	3.48	2.65	.67	..	.023
43-B	...	2.38	.73	.13	.024
44-B	...	2.60	.85	..	.024
45-B	...	2.44	.73	.13	.029

TABLE IV—Cupola Metal, Treated in 250-lb Batches Using 34% Silicon—7% Magnesium Alloy*

** Experiment No.	Sodium Carbonate Addition, Lb	Time of Contact, min	% Mg Added	% SMZ Added	Final % S	Final % Mg	% Mg Recovery	Heat Treatment	Tensile Strength psi	Yield Point psi	Elong. % in 2"	Red. in Area, %	Bhn	Remarks
15-B	2	3	.16	.20	.08	<.015	..							Entirely gray. Si-Mg alloy put on surface.
16-A	6	4	.19	.60	.05	<.015	..							Entirely gray. Si-Mg alloy put on surface.
17-A	None	..	.19	.20	.12	<.015	..							Entirely gray. Metal poured on top of Si-Mg alloy.
18-A	None	..	.32	None	..	...	..							Entirely gray. Metal poured on top of Si-Mg alloy.
27-A	9	6	.25	None	.014	.089	36	as cast		Defective bar			255	Desulphurized in one 250-lb ladle. Metal poured on top of preheated (about 900° F) Si-Mg alloy in second ladle. Final Si=2.76% slower cooling rate than bar immediately above.
								3 hr 1650° F; annealed	101800	81200	3	..	269	
								2 hr 1600° F; annealed	85800	59900	4	2.7	207	
28-A	None	..	.30	None	.038	...	..							Entirely gray. Metal poured from mixing ladle on top of Si-Mg alloy.
29-A	10	5	.21	.15	.017	.068	32	as cast	88000	63200	2.5	..	255	Desulphurized in one 250-lb ladle. Metal poured on top of preheated (about 900° F) Si-Mg alloy in second ladle. Final Si: 2.70%. Transverse str., 1.2" diam bar, as cast: 6080 lb, Deflection: 51".
								3 hr 1650° F; annealed	99200	65200	8	5.1	229	
								2 hr at 1350° F	83700	48800	4.5	2.7	217	
								2 hr 1600° F; annealed	86800	60200	8	5.5	202	
33-A	10	5	.22	.20	.026	...	..							Entirely gray. Desulphurized in one 250-lb ladle. Metal poured on top of preheated (about 1500° F) Si-Mg alloy in second ladle.

* Balance mainly iron. ** Suffix indicates type of base iron, from Table I. All test bars were .505-in. diam, from keel block legs.



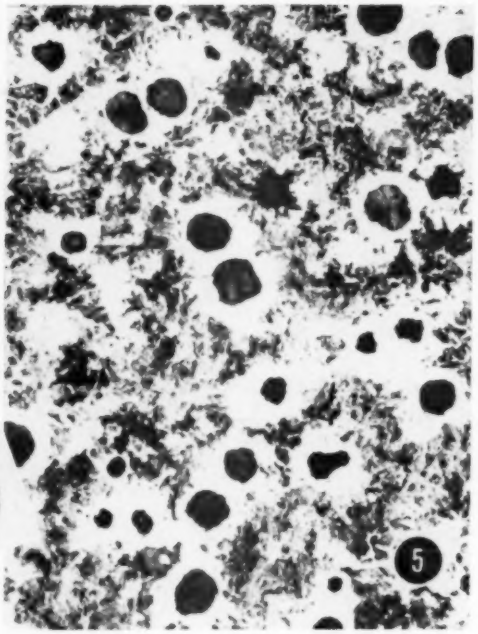


Fig. 3 — X100, unetched. Experiment 29-A. 0.21 per cent Mg added in form of 34-7 Si-Mg

Fig. 4 — X500, unetched. Shows two upper left nodules of Fig. 3

Fig. 5 — X100, picral etch. Same specimen as Fig. 3, showing approximately equal amounts of pearlite and ferrite. Three hours at 1650°F and annealed

eral procedure in treatment, as evolved from several preliminary experiments, consisted of these four steps:

1. A silicon addition, in the form of 85 per cent ferrosilicon, was added as tapping began from a receiving ladle into a well heated 250-lb ladle. When the ladle was half filled the floating ferrosilicon was stirred in, and the ladle filled to a weighed 250 lb of metal.

2. A sodium carbonate addition was made, and allowed to react for 3 to 5 minutes before skimming the slag thoroughly.

3. The Ni-Mg alloy, crushed to ½-in. and down, was placed on top of the metal and the cover of the ladle closed. The reaction proceeded to completion, and the heavy slag was then skimmed.

4. An SMZ addition was made, and stirred in; after skimming, the metal was poured.

Referring to the above steps, the ferrosilicon addition was made so as to bring the final silicon content up to approximately 2.60 per cent. The sodium carbonate addition was greater than would be required in treatment of larger quantities; 8 lb, or the equivalent of 64 lb per ton, reduced the sulphur from 0.14 per cent to about 0.09 per cent. Indications were that this procedure gave better uniformity than if desulphurizing were omitted entirely and a larger magnesium addition made. In Step 3, the reaction usually began about 2 seconds after the magnesium alloy was added, and was completed in 15-20 seconds. However, when the metal was too cold the reaction was delayed in starting, and lasted much longer.

Table II shows results obtained using 80-20 Ni-Mg alloy in treating 250-lb batches of cupola metal.

It will be noted that magnesium recoveries varied from 15 to 27 per cent, with the exception of experiments 38-B and 40-B; in these two, the metal temperatures were comparatively low, and recoveries of 43 per cent and 36 per cent, respectively, were obtained.

Most of the heat treatment was carried out in conjunction with production treatment of steel castings. This consisted of a 3-hour hold at 1650°F, followed by air-cooling; however, since the keel blocks were placed in the center of 10-20 ton loads, the actual cooling rates were quite slow, and consequently should be considered as annealing rather than normalizing. It is believed that variation in load density, and therefore in cooling rate, accounts for some of the heat treated bars having higher hardnesses than the corresponding as-cast bars.

In several experiments (34-B, 40-B, 43-B, 44-B, and 45-B), the heat treated bars had considerably lower hardnesses than the as-cast bars, yet the tensile strengths were higher than the as-cast bars. This may indicate a tendency toward breaking short, due to brittleness, of the as-cast bars; the brittleness, in turn, was probably due to the presence of a partial network of cementite.

Experiment 40-B shows the beneficial effect of inoculation (subsequent to the magnesium addition) on the ductility. The uninoculated heat treated bar had an elongation of 9 per cent and reduction in area of 5.8 per cent, while the corresponding inoculated bar showed 14½ per cent elongation and 11.2 per cent reduction in area.

Transverse bars 1.2 in. diameter were poured in some experiments, and transverse strengths and deflections of the as-cast bars, 18 in. between supports, are shown in Table II. Average values were 6360 lb transverse strength and 0.45-in. deflection.

The comparatively high ductility of two bars of 13-A and 14-A put through an 8-day malleable annealing cycle is of interest, though probably not of commercial importance at this time. The microstructure of these two bars was entirely ferritic.

Fig. 2 shows the typical microstructure of as-cast bars using additions of 80-20 Ni-Mg alloy to the cupola melted irons of Table II.

The largest batch of cupola metal treated with a magnesium alloy was 1600 lb. A 0.94 per cent silicon addition, in the form of 85 per cent ferrosilicon, was

TABLE V—Properties of Acid Electric Furnace Nodular Iron

Ladle No.	Approximate Weight of Metal, lb	Mg Alloy	% Mg Added	% SMZ Added	Final % Mg	% Mg Recovery	Heat Treatment	.505" Bars, from Keel Block Legs: Tensile Strength, psi	Yield Point, psi	Elong, % in 2"	Red. in Area, %	Bhn	Bhn, Surface of Keel Leg	Remarks
1	580	80-20 Ni-Mg	.22	.34	...	..	as cast	83800	53700	13	10.1	197	197	
							3 hr 1650° F; annealed	73500	.....	17½	16.3	174	...	
2	580	80-20 Ni-Mg	.22	.34	.053	24	as cast	8000	52500	15	11.5	207	187	
							2 hr at 1350° F	69800	47500	21	19.2	179	...	
3	580	80-20 Ni-Mg	.17	.34	.054	32	as cast	81400	.....	13½	11.1	197	187	
							3 hr 1650° F; annealed	73000	47100	16	16.0	170	...	Slight defect present
4	580	80-20 Ni-Mg	.17	.34	...	..	as cast	82800	55000	15	11.1	202	187	
							3 hr 1650° F; annealed	77700	50300	16½	11.9	187	...	Cut from body of keel block
5	580	80-20 Ni-Mg	.17	.34	...	..	as cast	79000	42000	15½	10.4	202	197	
							oil-quenched from 1600° F; 2 hr at 1200° F	80700	50000	12½	9.3	197	...	
7	580	80-20 Ni-Mg	.17	.34	.061	36	as cast	74800	49900	18	17.1	187	179	
							2 hr at 1350° F	68600	46700	22	21.7	174	...	
8	580	80-20 Ni-Mg	.17	.34	.061	36	as cast	78200	54700	15½	13.7	207	202	
							2 hr at 1350° F	69400	45500	22	22.3	167	...	
9	580	80-20 Ni-Mg	.17	.34	...	..	as cast	76200	40000	13½	11.2	187	192	
							oil-quenched from 1600° F; 2 hr at 1200° F	83000	57400	10	7.8	207	...	
					.036	15	(A)* as cast	81600	48000	14	10.8	187	241	
							3 hr 1650° F; annealed	82500	.....	14	9.3	179	...	
10	280	70-30 Cu-Mg	.24	.36	...	..	(B)* as cast	86900	46900	12½	10.0	202	235	
							3 hr 1650° F; annealed	87700	.....	12	10.8	187	...	
					.043	18	(C)* as cast	94600	55000	11	8.9	212	241	
							3 hr 1650° F; annealed	93000	.....	11	8.0	187	...	

Sulphur content before Mg addition, .022%.
* *A* denotes first keel block poured from this ladle, *B* the second, and *C* the third.

made to the Type B base iron taken from a receiving ladle. Also 30 lb of sodium carbonate were added, and allowed to react for 7 minutes. After skimming the slag, 24 lb of 80-20 Ni-Mg alloy (or 0.30 per cent Mg) were added. Final inoculation was made with a 0.19 per cent SMZ addition.

The entire 1600 lb was poured into a single mold. Net weight of the casting was 1100 lb, and section thicknesses were between 1½ and 4 in. Metal temperature from the receiving ladle was 2750°F and as poured into the mold 2540°F. Unfortunately, there was no excess metal left (*Please turn to page* 214)

TABLE VI—Chemical Compositions of Electric Furnace Nodular Iron Listed in Table V

Ladle No.	2	3	7	8	10 A*	10 B*	10 C*
Total carbon, %	3.52	3.61	3.68	3.59	...	...	...
Silicon, %	2.63	2.63	2.65	2.67	2.69	2.75	2.83
Manganese, %	.49	.47	.49	.48	.49	...	.49
Phosphorus, %	.037	...	...	.037	...	...	...
Sulphur, %	.017	.014	.013	.013	.013	...	.013
Nickel, %	.74	.65	.59	.69	...	...	...
Copper, %	.17	...	...	.17	.50	...	.48
Magnesium, %	.053	.054	.061	.061	.036	...	.043

* A denotes the first keel block poured from this ladle, B the second, and C the third.

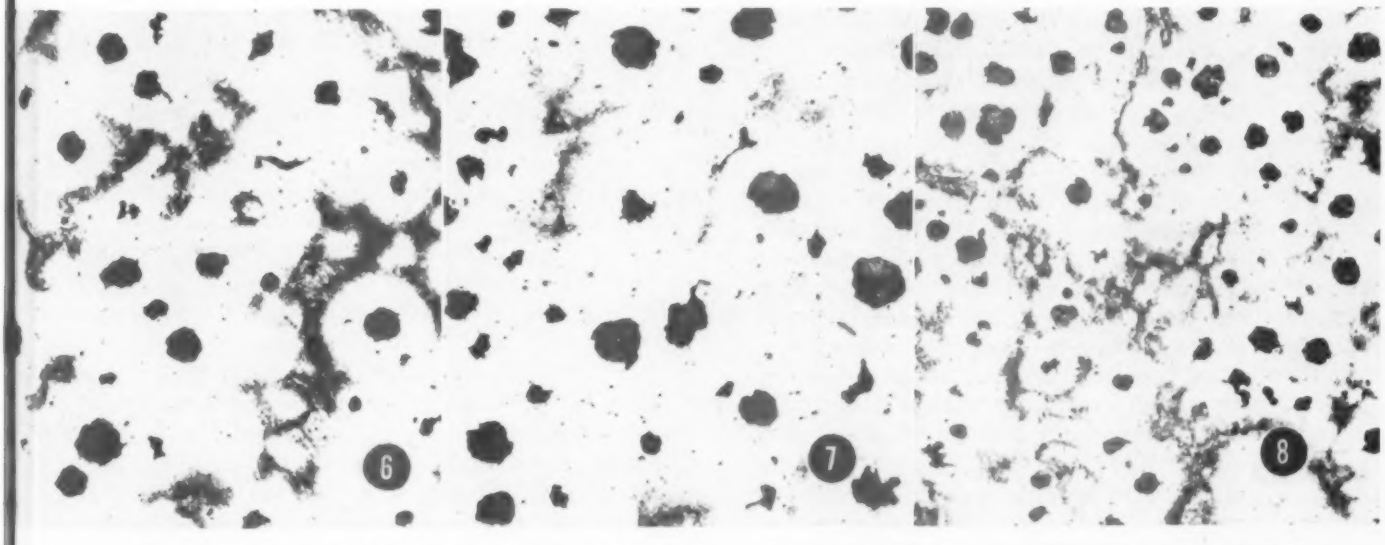


Fig. 6—As-cast bar of ladle No. 7 shows graphite nodules, ferrite and pearlite. X100, picral etch
Fig. 7—Heat treated bar of ladle No. 7. Some pearlite remaining after two-hour treatment at 1350°F
Fig. 8—Showing predominantly ferritic matrix of section ¼-in. thick. As-cast specimen, bhn 212

DETAILS given here of the malleable iron foundry industry's productive capacity are from a report submitted recently to the Munitions Board by the Malleable Iron Castings Subcommittee of the Foundry Industry Advisory Committee to the Munitions Board. Data are based on an industry survey conducted by the board. Similar studies of productive capacity and materials requirements of several other branches of the foundry industry are in progress. In addition to the capacity data and recommendations for mobilization procedure presented here, the malleable industry report also described experiences during World War II when malleable iron foundries were handicapped in obtaining sufficient manpower, materials and equipment because of lack of early recognition on the part of government procurement officials of the need for malleable iron castings as components in military end items.

Industrial Mobilization Plan for the

Malleable Iron Castings Industry

NO SATISFACTORY gage has ever been agreed upon for the determination of the capacity of a foundry. Various methods have been suggested and advocated, but there is some one or more objections to every known measure of capacity.

The result of this difficulty is that we fall back on the use of *tons* as a measuring stick.

The following table, based on U. S. Department of Commerce data, shows the tonnage produced by the malleable industry from 1940 through 1949:

1940.....	662,123 tons	1945.....	790,731 tons
1941.....	972,238	1946.....	752,028
1942.....	880,000	1947.....	895,054
1943.....	844,639	1948.....	933,091
1944.....	878,233	1949.....	713,107

It is estimated that production for 1950 will be about 900,000 tons.

In making the survey of the industry, producers were asked to state capacity of their plants by indicating, "as accurately as possible, the maximum tonnage of malleable castings you could expect to make of your present size and type of product with your existing facilities." In other words, a small foundry, in which the average weight of castings over a long period of time has been about 1 pound, would report a much smaller capacity than a foundry of about the same size where the average weight of castings had run about 2 pounds.

Experience demonstrates that a given foundry will produce about the same number of tons per year, year in and year out, allowing only for an adjustment required by an increase or decrease in the total number of castings produced, and this latter figure naturally varies according to the amount of business available.

Questionnaires were sent to all known producers of malleable iron castings, and a 100 per cent response was obtained. Malleable is produced by 100 companies in 113 plants. These companies are located in 22 states, but they are for the most part concentrated in New York, Pennsylvania, Ohio, Indiana, Wisconsin, Illinois and Michigan.

According to the survey, these companies have a total capacity of 1,195,681 tons per year.

Each producer was asked to estimate the amount of additional tonnage he might produce if "additional facilities were added to the present plant." The instructions which accompanied the questionnaire specifically asked that the producer not consider a *general* expansion of facilities, but asked that the answer be confined to "one or two additional things such as an annealing furnace, molding stations, etc., which would immediately result in overcoming serious bottlenecks and thus permit an increase in production by a substantial amount." The industry reports a potential increase of 172,320 tons, or a total of 1,368,001 tons.

It may be expected that the average weight per casting will increase as an incident of mobilization. This can result in a further increase in the capacity of the industry of from 5 to 10 per cent above the figure reported, since the capacities indicated by the several companies are predicated upon peacetime factors. This increase in capacity will require corresponding increases in raw materials and manpower needed.

Two new malleable plants have been built during or since World War II. One of these, at Danville, Ill., is now owned and operated by General Motors Corp. The other, built at Ashtabula, O., is owned and operated by Lake City Malleable Inc.

Three existing plants, in which malleable has been made but which are not operating, at the present time, were not included in the survey: (1) Warwick Malleable Iron Co., (*Please turn to page* 230)

The Castings Industry and The Munitions Board

Functions of the Munitions Board and the relationship of the castings industry to it during the present emergency are described. This report was presented by the author at the 48th Fall Meeting of the Steel Founders' Society of America at Hot Springs, Va., Sept. 25

By COL. EARL D. PAYNE
Industrial Liaison Officer
Munitions Board, Washington

ORGANIZATIONALLY speaking, the Munitions Board is one of the principal staff agencies of the secretary of defense. Other agencies are the Joint Chiefs of Staff and the Research and Development Board.

The mission of the Joint Chiefs of Staff is that of principal military advisor to the President, the National Security Council and the secretary of defense. The mission of the Research and Development Board is to advise the secretary of defense on the status of scientific research in reference to national security and assure adequate provision for research and development on scientific problems in reference to national security.

The Munitions Board is charged by the National Security Act of 1947, as amended, with the following duties under the direction of the secretary of defense and in support of the strategic and logistic plans of the Joint Chiefs of Staff:

1. Co-ordinate Department of Defense activities in industrial procurement, production and distribution plans.
2. Plan military aspects of industrial mobilization.
3. Assign interservice procurement responsibility and plan for specification standardization.
4. Prepare potential production and personnel estimates for evaluating logistic feasibility of strategic operations.
5. Determine priorities within military procurement programs.
6. Supervise assigned subordinate agencies.
7. Establish most efficient interservice logistic organization.
8. Develop policies for military versus civilian requirements, particularly on strategic and critical materials and correlate with other federal activities.
9. Reconcile the logistic requirements of the Joint Chiefs of Staff with those of supply agencies, recommending action to the secretary of defense.

The Munitions Board is also responsible, under Public Law 520, for establishing the policies and objectives for the attainment of a national stockpile of strategic and critical materials.

The organization of the Munitions Board established to fulfill its function consists of a civilian chairman appointed by the President of the United States, the assistant secretary of the Army, the assistant secretary of the Navy, and the under secretary of the Air Force.

The staff of the board is headed up by the director of the staff, Major Gen. Patrick W. Timberlake, and the assistant director of staff, Brig. Gen. E. C. Langmead. Under the director of staff are two directorates, the director of supply management, Rear Adm. M. L. Ring, and the director of production management, Maj. Gen. J. V. Matejka. Under these two directorates are the offices of Production Planning, Materials Resources, Construction, Manpower, Procurement Methods, Distribution Methods, Standards Agency, Materials Inspection Agency, Cataloging Agency, Aircraft Division, Petroleum Division, and Electronics Division.

So much for the organizational structure. I should like to stop here to stress the nature of several of the functions of the Munitions Board and some of the things it does and does *not* do. The Munitions Board is a segment of the Department of Defense and as such its principal responsibilities fall within the field of planning as that planning relates to the military. The National Security Resources Board, in its role as an advisory agent to the President, has the responsibility of advising the President with reference to the co-ordination of military, industrial and civilian mobilization.

With reference to the stockpile program, I think it is important to again emphasize that the stockpile is a *national* stockpile, not a *military* stockpile. This national stockpile of strategic and critical materials consists of a physical inventory of basic industrial materials considered to be of sufficient importance and established short supply to the industrial economy during an (*Please turn to page* 253)

Fig. 1 — "Venus and Manhattan," cast aluminum group, attached to the face of the new Parke-Bernet Galleries building in New York. The 1200-pound group is said to be the largest sculpture ever cast in aluminum

Fig. 2—The author taking point on shelf from pantograph in forming the armature of "Venus"

Fig. 3—Completed armature for female torso. Arm section, cast separately, also in place

By JOSEPH MORRIS

Large Sculpture Group

Cast in Aluminum

LOOKING up at the large aluminum sculpture group, "Venus and Manhattan," which decorates the face of the new Parke-Bernet Galleries building, New York, it is hard to believe that the original three-dimensional sketch of it fitted neatly in a penny match box. But it's true!

Following preliminary approval of pencil sketches from architects Walker & Poor and from Robert W. Dowling of the City Investment Co., owner of the building, sculptor Wheeler Williams prepared a tiny wax model of the proposed group. In all essential details the miniature is an exact replica of the figures on the building facade today, two 12-ft figures in unpatined aluminum.

The "Venus and Manhattan" is believed to be the largest sculpture ever produced in aluminum. Only those familiar with the subject can realize the difficulties encountered by sculptor Williams, his studio crew, and John Spring, owner of the Modern Art Foundry, Long Island City, N. Y., in turning out the full-size group.

It was not alone a question of technical problems to be conquered along the way, but also the fact that from the first the pressure was on. While actual enlarging of the group from the model, studied at one-third final scale, was not begun until May, 1949, it was imperative that the contract be completed in aluminum and on the Parke-Bernet by Nov. 2, the date set for the dedication of the building. On the face of it this was an almost impossible task. To meet the deadline meant that the two figures had to be modeled full size in plastelene, molded and cast in plaster of paris. The plaster patterns had to be shipped to the foundry, molded and cast in aluminum, cleaned, chased, assembled and mounted on the face of the building, in a period of six short, hectic months.

From the outset Williams realized that the only way to beat the time problem would be to break the group down into several sections. No section could be larger than a certain specified size because each part had to leave the studio on a small passenger elevator. To enlarge, mold and cast two sections at the same time, he had to develop and follow an overlapping schedule.

As soon as the head and torso section of the male figures was enlarged from the intermediate 4 in. to 1 ft study at one end of the studio, the section from the hips down was enlarged at the other. When the first was completed in plastelene, it was taken down for molding and casting. A third section—"Venus" head and torso—was set up in its place for three-dimensional pantographing to full size. Finally the

Fig. 4—Clay is applied, first with nubbins pointed to meet the pantograph at myriad points. The spaces between these check spots then are filled

Fig. 5—Section of male figure full scale in clay. Thin brass strips are attached to form divisions in the plaster mold and to facilitate its removal

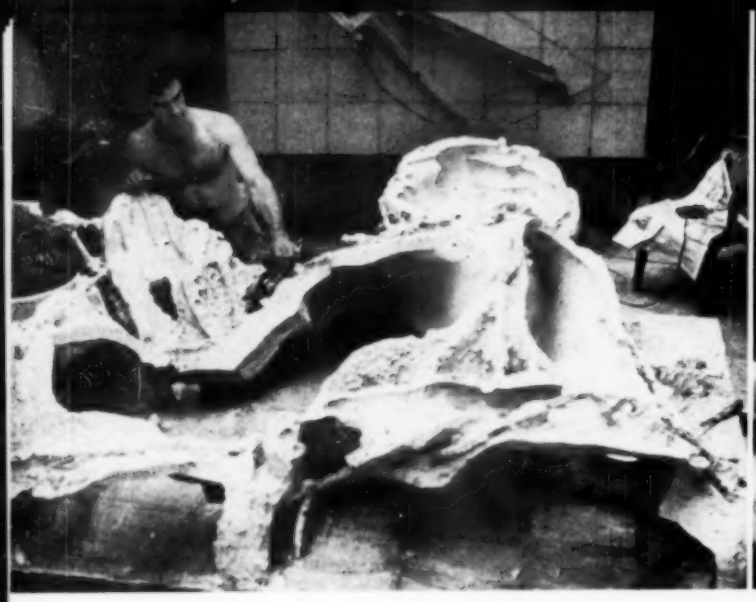


Fig. 6—Completed waste mold for the male figure. Various sections of the figure have been removed

Fig. 7—The sculptor inspects male figure torso surface with air bubble holes and seams removed

right arm and drapery followed the male limbs at the opposite end of the studio.

These larger sections were broken down into smaller sections for convenience of reproduction at the foundry, and also to solve the elevator problem. Breakdown was accomplished by dividing the interior of the molds of the larger sections into separate divisions. Plastelene walls were used as shutoffs between divisions, and a male roman joint key was modeled on the side of the wall which would be cast first.

When this piece was filled with plaster, a reverse (female) impression of the plastelene wall and male key automatically resulted in plaster. After the plaster had set, plastelene was removed. The joint was shellacked and greased. The adjoining piece was filled, thus forming the corresponding male joint. In this way it was possible to break down the male figure's upper section into head, left arm and right arm. All these finished plaster patterns had roman joints which dovetailed the sections perfectly with the torso.

With the "segment assembly line" system developed it was possible to work more rapidly. As each section of the pattern was chipped free from the mold, it was de-seamed, retouched and shipped to the foundry without waiting for the other parts. In some cases minor parts were in process in the foundry while the main section to which they belonged was still in the mold.

One inherent weakness to this progressive segment method was that one could not be sure that, for example, the male torso section, made in one part of the shop, would dovetail with the hips-down section made in another when the time came to join them in aluminum. How could accurate fit and alignment be assured, if there was no chance to check with the two large plaster patterns? The torso would be gone long before the leg part was completed.

Williams decided false segments would have to be made. With the male figure this false segment was a portion of the drapery covering the midriff. As with the smaller (*Please turn to page* 226)

Fig. 10—Mold or mummy case for one of the parts being set in stacked flasks before ramming sand

Fig. 8—Applying fine-detail wax to glue mold at the Modern Art Foundry, Long Island City, N. Y.

Fig. 9—Sculptor retouches wax pattern. Head is plaster. Note female roman joint at lower left

(Photos, Figs. 10-11, by Hal Phyfe, New York)

Fig. 11—Wheeler Williams (left) and John Spring (right), the foundry owner, discuss final details on "Manhattan"

Production Line Technique Applied to

Foundry Labor Accounting

FERRO Machine & Foundry Inc., Cleveland, extends its searches for the best way of doing jobs to every department of the business, including the office. Over a period of years this company has operated a variety of different payroll and labor costing procedures, constantly seeking the most economical plan to produce the payroll accurately and promptly and, in the same time, give management comprehensive daily and weekly reports of the manufacturing operation.

Today, Ferro pays its 2500 employees on Thursday for a pay period that closes at 8 a.m. Monday. On several occasions it has been necessary to pay on Tuesday for the period ending the day before. It was accomplished with little overtime, which is a rather remarkable schedule considering the payroll summary is made up of a minimum of 30,000 transactions a week.

Since labor costing and payroll are so interlocked it is difficult to give an accurate report of the total number of man-hours it takes to achieve this efficient schedule. The organization applies 370 hours to strictly payroll procedure (posting to weekly pay summary cards; posting deductions to weekly pay cards; posting totals on the daily posting control sheet, computing and writing the payroll). The latter takes 30 man-hours a week.

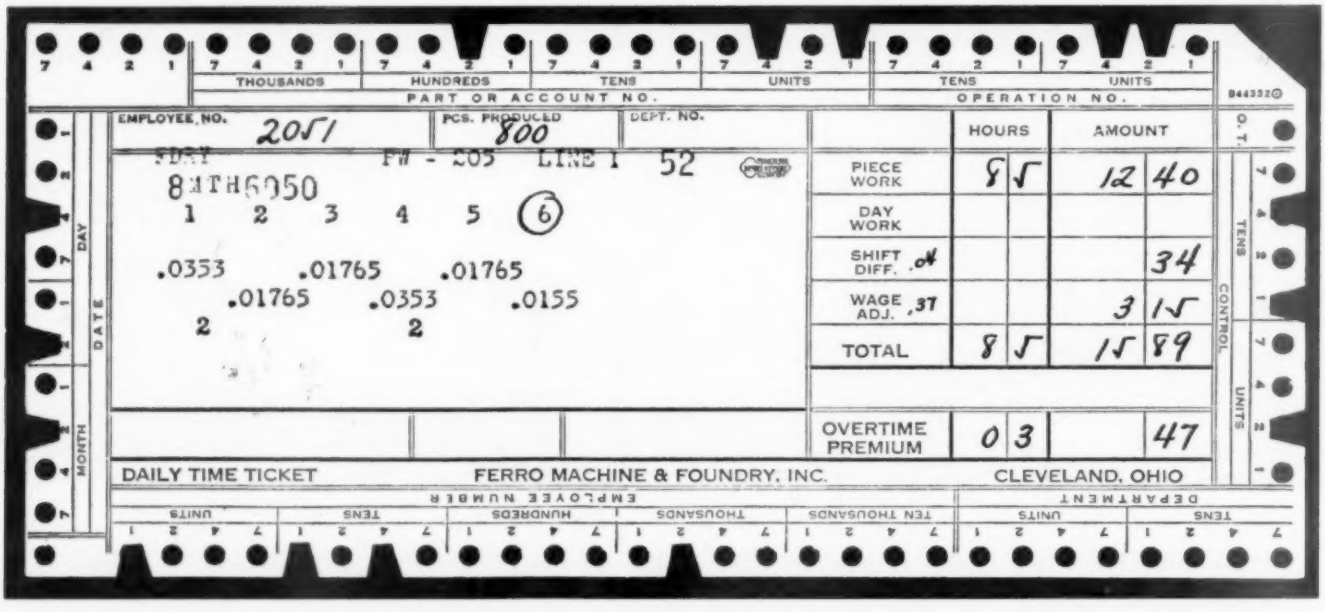
Headquarters of the payroll and labor distribution system has the usual complement of adding machines, typewriters, two bookkeeping machines and several efficiently busy people. The use of the Keysort daily time ticket, which permits quick and accurate consolidation of more than 30,000 transactions a week to payroll summary cards and cost control sheets, is the reason the payroll is completed on time and the final reports are ready by the second working day of the month.

The time or job card is much like any other in that it carries on its face the usual information needed for payroll and costing. It differs in the holes around the margin which, when notch-punched, correspond to information on the face and permit quick and accurate sorting. Through the medium of the holes and notches cards involving employees, parts, operations and other controls are sorted easily, added and the totals posted to summaries.

The payroll and costing procedure starts with shop timekeepers and checker who prepare individual employee time tickets, carrying the employee's name, clock number, part number with operation or account number and the number of pieces produced. In actual practice much of this work is done in advance. The timekeeper also makes a tally sheet of all individual time tickets issued.

Members of the timekeeping department post the information from these employee time tickets to daily job-time cards, which have (*Please turn to page* 246)

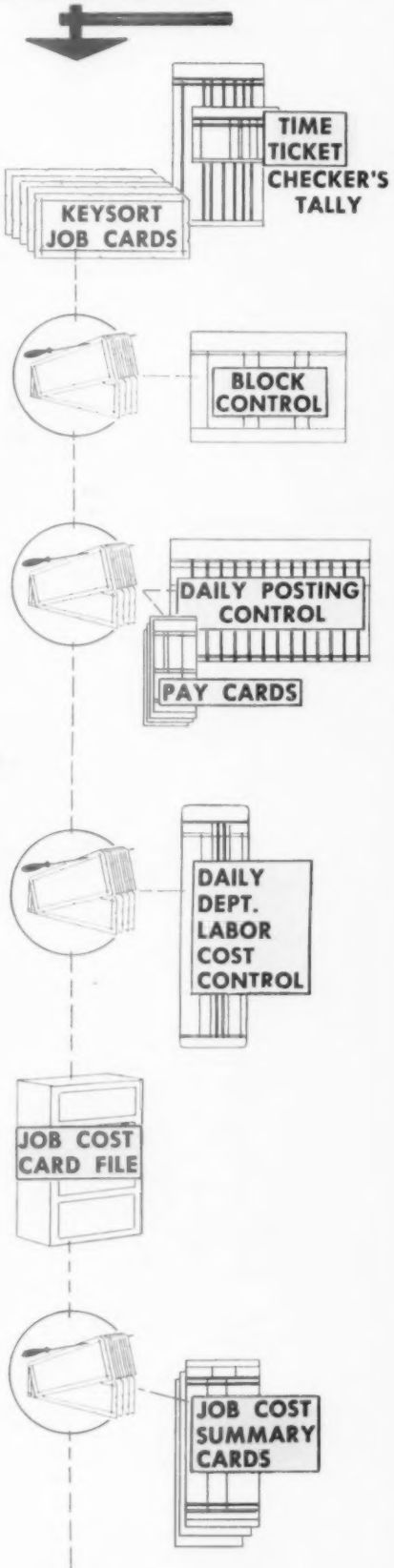
Fig. 1—Punched holes around the job ticket make it articulate. Each group of holes represents a classification of information on the card's face



By EDWIN A. HENRY
Director of Payroll Department
Ferro Machine & Foundry Inc.
Cleveland

Fig. 2—Job tickets are prepunched for part number and department. Fig. 3—Employee number and date are punched after the card reaches the payroll department from the foundry. All information punched on the edges is also on the face of the card. Fig. 4—The 30,000 weekly transactions making up the company's payroll and labor cost reports are sorted daily and posted to summaries

THE PRODUCTION LINE of FERRO'S PAYROLL & LABOR COST OPERATION



THE Camera - A USEFUL FOUNDRY TOOL

By BENJAMIN MELNITSKY

THE camera can be used in the foundry on a pay-as-you-go basis and can deliver substantial returns on each dollar invested. This instrument has a service potential in basic and applied research, in quality and production control, in safety education, employee training, product development, sales, maintenance, and in all other phases of foundry operations. This is a large order. Yet there is ample evidence of the camera's ability to deliver.

The camera which in the not-too-distant past was little more than a hobbyist's gadget has become an indispensable scientific and industrial tool. Over $100,000,000 is expended yearly by industry for photographic materials and equipment. There are now 55,000 industrial x-ray laboratories; completely equipped photographic departments function in over 3000 concerns. Servicing industry are a small army of commercial photographers, numerous processing and finishing laboratories, and close to 500 firms producing motion pictures on technical subjects.

Far more convincing than these and other statistics that might be cited is the existence of healthily-expanding photographic and radiographic departments in numerous foundries. Far more encouraging—from the long-range viewpoint—is the ever-increasing use of the camera in metallurgical research at the Battelle Memorial Institute, the National Bureau of Standards, the Armour Research Foundation, and elsewhere.

Prior to investigating camera uses, a brief nomenclatural study might be in order because in the camera field words are tossed about freely and frequently incorrectly. X-ray pictures are not photographs but radiographs. Where electron radiation is used, as in the electron microscope, the result is an electron micrograph not a photograph. In its strictest sense, a photograph is a picture produced by the action of visible light on sensitized paper or film. The word is also used where infrared or ultraviolet radiation—both invisible—serve as illuminants. The camera has in recent years been joined with the spectroscope, microscope, stroboscope, stereoscope, betatron and other scientific instruments. The least happy consequence has been the growth of a nomenclatural jungle in which the nonphotographic layman is often helplessly lost. Words are linked together sausage-like in the best Germanic tradition—thus photography plus microscopy equal photomicrography. Often words are placed into a lexicographic "cocktail shaker" and vigorously mixed—photography, metallurgy, and microscopy, when given this treatment, become metallography. Other terms of interest in foundry work will be introduced in the paragraphs that follow and be explained in context.

Of all types of equipment discussed here, the least expensive, the least complicated, and often the least appreciated is the ubiquitous still camera. With the aid of this instrument a surprisingly broad range of foundry tasks can be performed. One such is inventory-taking, normally a costly, time - consuming, entirely inconvenient undertaking. At the Plomb Tool Co.'s Los Angeles plant, a simple camera technique has done much to mollify periodic inventory pains. Steel bars are no longer counted in the storeroom; instead, they are photographed. Enlarged prints are delivered to the front office where skilled clerks total the number of bars shown on the photographs and post inventory sheets. Rack sections are keyed so that size, type and length of each pictured bar are known. Preliminary lining up of stock and measuring odd lengths are done at the convenience of stockroom personnel days or weeks in advance. The actual photographic inventory lasts but a few hours; hence there is a minimum disruption of operations in both storeroom and shop. Because the count is made by trained office personnel, using adding machines and working in comfort, the margin for error is reduced considerably. Rechecking is simplified; photographs are saved to provide a convenient, permanent record which is far superior to reams of greasy, worked-over inventory sheets. The camera can also be called in for most other materials and parts that are inventoried by count rather than weight.

A related camera technique is now being used in foundries for a different recording purpose. As in inventorying, two of the camera's major attributes—unfailing optical "vision" and faultless, photographic "memory"—are employed profitably. A camera—often of the inexpensive candid type—is positioned before a meter, dial, or some other control device and

Fig. 1—High-speed photography is employed at Battelle Memorial Institute in the AFS-sponsored research study of fluid flow in transparent molds

Fig. 2—Microfilming unit for recording engineering drawings and other documents on 35-mm film

Fig. 3—Metallographic microscope used to study metal structure and determine effects of alloying elements, impurities, heat treatment, etc.

the instrument reading photographed. Entirely eliminated are the inevitable errors that occur when this information is transcribed manually. With such a mechanical monitor, manpower costs are reduced and the element of human fallibility eliminated. In the research laboratory where cathode ray tube oscilloscopes and other electronic controls are in service, the camera performs an added function. Not only does it make a permanent record, it also records wave traces which are too rapid for the eye to follow. Where gages and control dials are buried or for some other reason inaccessible, an automatic camera is constructed as an integral part of the unit. Photographs of the instrument faces are snapped at set intervals. These are retrieved to provide an otherwise difficult check on instrument readings.

Another example of the camera as a foundry tool is to be seen in the experience of the American Brake Shoe Co. An explosion caused by a leaky valve demolished the coreroom at one of the firm's plants. As one of its spokesmen stated, "Photographs of what was left of the coreroom were taken from all possible angles and the prints were forwarded to every foundry in the company. The explosion occurred in one plant. By photography it occurred in sixty." There was a gratifying reduction in number of leaky valves after maintenance workers were shown this set of prints. This example calls for an obvious remark. It is almost an unwritten law that every discussion of photography must include at least one mention of the fact that a picture is worth *a thousand words*. Trite as the expression may be, there's no gainsaying its validity. The picture of the demolished coreroom was, in fact, worth any number of words. The same holds true for other areas of safety education. Sound working habits can be dramatized, the need for personal cleanliness made manifestly clear, good housekeeping practices encouraged—in these and other instances by photography.

It is often argued that pictures are available from insurance companies and others concerned with promoting safety; hence there is no need for the foundry to take its own photographs. Although the outside safety photos generally are excellent, they lack the important ingredient of immediacy. A photograph of a completely destroyed foundry in San Francisco has less of an impact on a Detroit foundry employee than a view of a minor fire in his own shop. Similarly, the picture of a fellow worker demonstrating safe work habits is many times more persuasive than a better and more dramatic photograph of a stranger.

The camera as a word-substitute has uses in fields other than safety education. One of the larger foundries follows a standard practice of recording photographically each step in the construction of special apparatus not obtainable commercially. Subsequent duplication or replacement is thereby simplified. In another foundry photographic records of gating, pouring and other techniques help to establish standard practice, and, consequently, speed up production. This same concern has a central staff of engineers and architects who supervise and plan maintenance and construction work in all of its many branch plants. This economical remote control is facilitated and, in many instances, made possible by photography. A central file with several thousand prints is a source of detailed pictorial data on physical features of each plant. Proud parents with snapshot records of their offspring's growth are emulated by foundries whose photographic records of physical plant development are no less complete. Pride is not the sole motive for maintaining such a snapshot album. It permits objective evaluation of past maintenance and construction measures and, even more important, provides a solid basis for future planning.

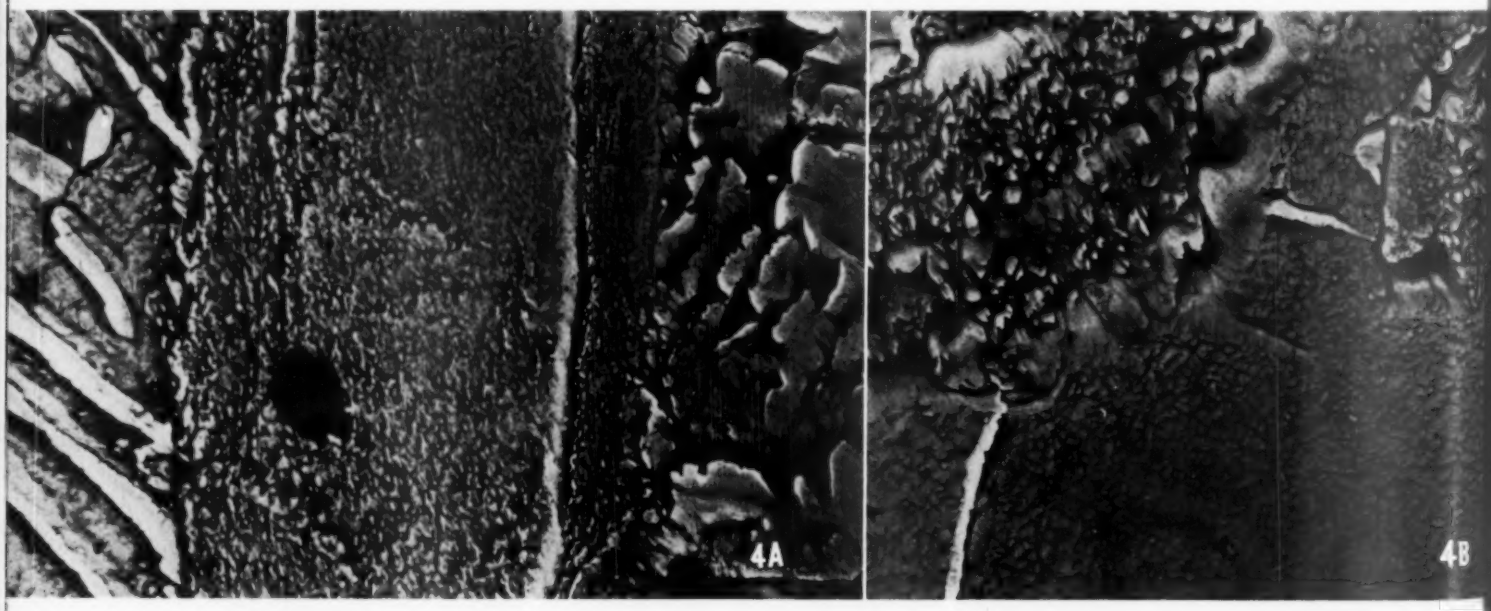


Fig. 4—Micrographs made by the electron microscope. *A*—Flake graphite in gray cast iron. Pearlite to right and left of graphite. X10,000. *B*—Irregular-shaped graphite nodule in malleable iron. Rough graphite

Another use for the still camera is the photographic standards book. In its essence, standardization is the establishment of norms against which performance, appearance, dimensions and other measurable factors can be compared. The end purpose of standardization is simplification, but standards themselves are often hopelessly complicated. Much of their wordiness can be pared photographically. One division of the American Brake Shoe Co. insures uniformity in its rejection reports by means of a standard book containing photographs of frequently encountered casting defects. A detailed description accompanies each picture. Inspectors no longer speak of "pipe," "porosity" or some other diffuse term, nor do they hand in rambling descriptions of the castings they are rejecting. Instead, they refer to a specific picture in the standards book.

The oldest standard, the blueprint, is in an increasing number of industrial concerns a camera product. By means of photostats, xerography, and other processes, drawings are duplicated on photographic paper or recorded on miniature film. The last-mentioned process reduces by as much as 98 per cent the amount of filing space for engineering drawings, records, correspondence, and other paper work. A British foundry reports that it required 1500 square feet of floor space for its half-a-million engineering drawings; today the entire collection is microfilmed and stored in two drawers of a standard letter file.

Photographic foundry techniques often have remote origins. During the war, steel plates in shipyards were coated with a light-sensitive solution onto which drawings of parts to be flame cut from the metal were printed from photographic templates. The worker simply traced with his cutting torch the lines printed on the metal. The same basic procedure has been adapted for photographic scribing of castings. Guide lines to be followed in broaching, drilling, or

above; smoother ferrite below. X10,000. C—Magnesium plus 6.7 per cent La as cast. X16,000

Fig. 5—Operating an electron microscope at the Laboratory Development Division of Dow Chemical Co.

finishing are projected from a photographic template into the cast part which was previously treated to receive the image. In this fashion, a lengthy scribing job is accomplished in a few minutes. Where the same part is cast in, let us say, five different sizes, only one template is required because the projected image can be made smaller or larger by a simple lens adjustment. The photographic template method is also used in the manufacture of casting patterns, molds and forms.

Where motion picture equipment replaces the still camera, new foundry applications accumulate. Chief among these is employee education in safety, foundry methods, metallurgy, and other topics. Illustrative of work in this field is the 45-minute silent movie, "The Flow of Molten Steel in Sand Molds," recently prepared for the Steel Founders' Society of America.

An unusual example of the motion picture as a tool in foundry operations is to be seen at a plant which found it necessary to subcontract part of a large job. Normally it would have been necessary to send detailed instructions to the second plant plus several representatives to demonstrate how the difficult casting was to be fabricated. A far simpler expedient was followed. A motion picture of the casting cycle was made and then shown to the personnel of the subcontractor's plant.

Cinematography—the technical name for movies—is used in making time-and-motion studies, as well as in sales and public relations programs. At Battelle Memorial Institute (Fig. 1) high-speed cinematography has been employed in the American Foundrymen's Society study of fluid flow phonomena in gating systems of transparent molds.

Higher—both in cost and locale of operation—is aerial photography. Mentioned here are two uses for the photographic bird's-eye view. The first is a bit remote and has to do with the discovery of minerals and metals. Because the aerial photograph reveals geological factors often invisible from the ground and because a single picture may take in several square miles of terrain, prospectors now select areas for field study from such pictures. A typical example is the recent discovery of valuable deposits of pegmatite in Canada. The clue that led to this finding was a strip of igneous rock only a foot wide discovered on an aerial photograph. The second, and much-closer-to-home, use is in plant site selection. Transportation facilities, accessibility to local suppliers and customers, availability of extra land for future expansion, and numerous other factors which should be considered are clearly visible on aerial photos. Many companies have adopted the sound policy of never talking real estate until they have before them an air photograph of the land in question.

Fig. 7—Radiographers marking a cast steel muffle section for x-ray examination

Fig. 6—Microphotometer used to obtain x-ray diffraction pattern in the study of metals

The direct opposite of aerial photography is photomicrography. Lacking this key to the microworld, industry would still be blundering about in a metallurgical dark age. In recent years science has made tremendous strides in combining microscopy with photography. Under the powerful gaze of the microscope-camera, the skein of mystery is being unraveled from metal fatigue, corrosion, alloying, aging and other phenomena which are only partially understood.

The conventional optical microscope—using a light source and polished glass lenses—can produce a clear image up to 2000 times greater than life size. When ultraviolet radiation is substituted, maximum useful magnification is approximately 3000 power. Increased magnification, brought on by adding more lenses or improving the mechanism, result in a blur. The limiting factor is the wave length of radiant energy employed. The shorter the wave, the higher the useful

Fig. 8 — X-ray diffraction apparatus in a foundry metallurgical department

Fig. 9—Spectroscope used for determination of minor constituents in metals

magnification. X-rays whose wave length is from 100 to 10,000 times shorter than light would seem to be the answer to the need for super-magnifications. However, means of focusing such radiations are now only in a very early stage of development.

Electrons fit the bill even nicer—the wave length associated with a beam of moving electrons that have been accelerated through a potential difference of 60 kilovolts is 1/100,000 that of light. On the basis of studies made by Prof. Hans Busch in 1926 and by others, scientists have been able to control electrons by electromagnetic means in a fashion analagous to the control of light rays by optical lenses in conventional microscopes. The first commercial electron microscope was marketed in 1940 by RCA, others have since been developed. With this super-eye, direct magnifications of from 200 to 20,000 power are forthcoming. Photographically, enlargements as high as 200,000 power are possible. This greater enlargement is possible because the fine resolving power of modern photographic film actually records details too small to be seen in direct visual examination of the film. This is easily demonstrated. Should the reader look closely at the pictures on this page, he will, if his vision is good, note them to be made up of fine, halftone dots; photographs of the same pictures can be enlarged many times to show coarse, uneven dots, varying tremendously in size.

The fine resolving power of modern photographic film explains why this very page could be recorded, without the loss of a single dot over an "i," on a piece of film the size of a pin head. It also explains an interesting technique called microradiography. A specimen of the metal to be studied is covered by a lead sheet with a tiny pinhole opening. X-rays directed onto the sheet penetrate to the specimen only at the tiny opening. The x-ray picture thus produced is then enlarged photographically as many as 300 times. By this interesting and simple method it is possible to examine the microstructure of metals in depth as well as in cross section. This method has been used to determine such questions as whether copper in an aluminum alloy is in solid solution or not.

Without leaving the field of radiography, we can examine another unique camera attribute which might be labeled, "cumulative vision." A familar example will demonstrate this property. If a thin-sectioned casting is set between an x-ray source and a fluorescent screen, radiation passing through the cast piece creates a shadowgraph on the screen. If a thick casting is substituted, the rays are not strong enough to produce a *visible* image. A person might stare at the screen for hours and see no more at the end of this period than he did at the beginning. The camera is different in this respect. Over a period of seconds, minutes, or even hours, the faint x-ray image "builds up" on film and becomes visible after film processing.

This cumulative property explains why fluoroscopic testing of castings is less important than more expensive radiography. Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., reduced scrappage on a certain part from 14 to 1.2 per cent by changes indicated in radiographs. At the University of Rochester a million-volt x-ray unit was acquired as part of a co-operative program in which twenty local foundries participated. One of these firms had had the common and costly experi- (*Please turn to page* 206)

QUESTIONS and

How To Color Brass Castings

Q.—We will appreciate any information you can supply on oxidizing brass castings.

A.—Your inquiry undoubtedly refers to the practice of producing a brownish coloration on brass castings which gives them the appearance of weathered bronze. First step is to remove all grease from the object which is accomplished by placing it in a boiling 5 per cent caustic soda bath. Length of time of immersion will vary, but we suggest 15 minutes. After degreasing with caustic soda, the casting is rinsed thoroughly in running water at room temperature.

Second step is pickling which consists of immersing the casting in a dilute nitric acid bath composed of 1 part commercial nitric acid in 50 parts by volume of water. Time of immersion is 5 minutes; after which the casting is rinsed thoroughly in running water. Transfer the casting immediately to the coloring bath, hanging it if necessary by a string (not metal) for the required period. Again rinse thoroughly in hot running water, preferably not under 200° F, and transfer to a cloth bag filled with sawdust, and shake until dry. Period of immersion in the coloring bath will vary according to the depth of the color desired. Simple coloring bath is composed of 20 per cent commercial ammonium sulphide diluted with an equal volume of water. Solution is used at room temperature.

Has Trouble in Melting Copper

Q.—We have a home-built open fire furnace heated by propane gas and have been trying to melt copper in it without much success since we get 8 lb of slag with 10 lb copper. How can we melt the copper without so much slag? We seem to have trouble obtaining heat, and would like to know what mixture of air and propane gas should be used for melting 50 lb copper per hour. Is there a particular type of copper more adaptable to molding than others, and is a flux needed; what kind? What kind of a crucible is used? What type of furnace heated by propane gas is suitable for this purpose?

A.—Without any specific information on the type of furnace other than that it is an open-fire one, we assume that it is one in which the flame impinges on the metal or alloy to be melted, or perhaps passes just above the latter. While furnaces operating with that principle are in use commercially, we do not believe that it is practical on such a small scale as indicated, and we suspect that the difficulty lies in burner and combustion tunnel design which permits generation of most of the heat outside the furnace.

Propane is a high Btu content fuel containing around 2500 Btu per cu ft, and basing requirements on figures available for natural gas, it would require about 52 cu ft of propane gas to melt 50 lb copper. Propane requires a large amount of air for complete combustion, namely 23.4 volumes per volume of gas. Since in practice an excess of about 15 per cent is needed, the amount of air required would be about 1400 cu ft.

It is our belief that you will be much further ahead if you purchase a crucible type furnace designed for use of propane as the fuel, and employ a graphite or silicon carbide crucible. Copper usually is melted under a *dry* charcoal cover since it is quite susceptible to gassing. If the copper castings must possess high electrical and thermal conductivity, the metal must be degassified by use of fluxes containing lithium, boron, etc., a number of which are available on the market. If conductivity is not a requirement, use of 1 or 2 per cent zinc will permit production of sound castings.

Due to the tendency of copper to pick up deleterious gasses during melting which results in unsound castings, skill and practice are required in its handling. Since no mention is made of what the castings are to be used for, it is difficult to suggest a substitute for the copper. A large number of copper-base alloys are available which meet various service applications, and which are much easier to handle than copper. We suggest that you get in touch with any of the various ingot manufacturers whose names and addresses may be found in the Where-to-Buy Directory on page 280 of this issue, stating your problem, and they will be glad to advise you on a suitable alloy.

Molding Brass Plumbing Goods

Q.—In our foundry in Australia we manufacture mainly plumbing goods such as traps, bib cocks, valves, etc., which in most cases have a metal thickness of ⅛-in., and the alloys include No. 1 brass (65 cu, 1 Sn, 2.5 Pb, remainder Zn), 85-5-5-5, and 88-10-2. We also cast metal letters for public buildings, etc. which must have good clean surfaces. Practice is to make nearly all jobs in halves on metal plates in iron flasks and tapered steel snap flasks. These are then turned on their sides, boards placed on cope and drag, clamped together by straps and wing nuts, and poured through holes in the sides of the flasks. This entails quite a bit of work, and we wonder if that procedure is necessary. We have experimented with pouring temperature for traps in No. 1 brass and found they were short run at 1075° C, but successful at 1125° C. Do you consider that high? Some of our cores are blown, but the majority are made in halves and stuck together. Can you suggest a way of wiring the small sand cores for bib cocks so that they may be blown?

Answers

Also can you supply us with a few suitable mixtures for both general cores and those for blowing? We use a proprietary linseed oil base binder. Would you state briefly the latest technique in melting and pouring nonferrous alloys in the United States?

A.—Perhaps at one time there might have been some reason for making plumbing goods in the manner you describe, but the practice in this country is to mold and pour in the horizontal position. Years ago a firm here made pattern equipment for a New Zealand foundry to be poured in the vertical position as you describe, but as you mention, it involves a great deal of additional work as compared to molding and pouring on the horizontal or in the flat position. The pouring temperature you mention for No. 1 brass is about in the desired range. As it is high in zinc (30 per cent), there tends to be a heavy distillation of that element when heated to high temperatures. Hence one around 2050° F (1121° C) is employed.

Many bib or faucet cores are blown without the use of wires, but that will depend upon the size of the smallest section, for example the seat section. Where wires are used, the practice is to practically fill one-half the box with sand by hand, place the wire in a position, put on the top of the box, and blow the core. As far as core mixtures are concerned they vary considerably from foundry to foundry, and there is no standard. However, for blowing you might try either of the following which are used for small valves and plumbing goods. One is made of 91 qt beach (silica) sand, 7 qt bank (molding) sand, 2 qt core oil, and 3.5 per cent moisture. The other is composed of 49 qt each of beach and bank sands, 2¼ pt core oil, and 3 per cent moisture. Relative to melting practice, we suggest that you consult R. A. Colton's article "Melting Practice for Copper-base Alloys" which appeared in the January issue of THE FOUNDRY.

Technique on Chilled Wheels

Q.—We are having some difficulty making small car wheels 20 in. diam and weighing 260 lb. Should this casting be molded face up or face down? What is the best method of gating? What depth of chill is required on this size wheel?

A.—Chilled car wheels always are cast flange down—that is, with the flange in the drag. With a wheel molded in this manner, any dirt will float to the top of the rim and leave clean, solid metal in the flange. Clean treads are obtained by fast pouring and hot metal. The mold is gated on top of the hub, through two small gates, one at each side of the center core. The gates are fed from a pouring basin which is kept filled until the mold is full.

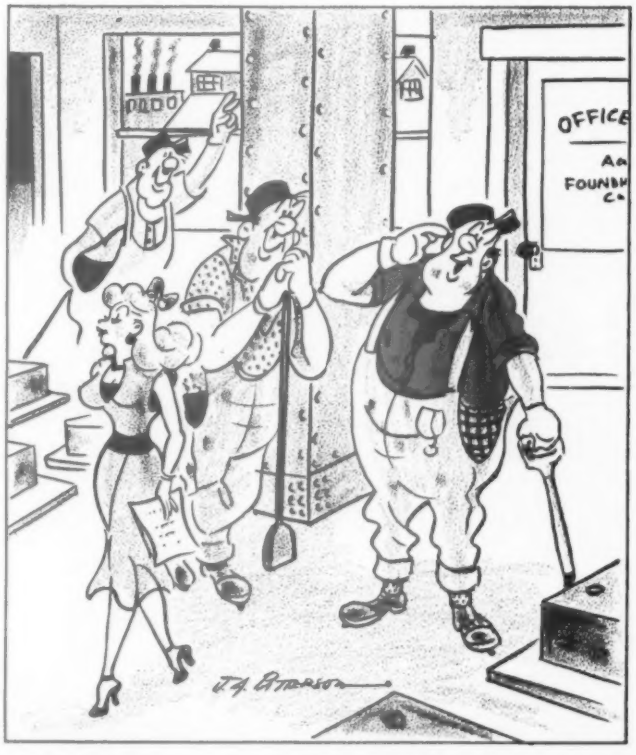
For a wheel 20 in. diam the chill should be about ⅜-in. in the throat, which is between the flange and the tread. A satisfactory chill test block would show about ¾-in. The test piece, 1½ x 2½ in., is cast on edge against a chiller. Approximate analysis of metal suitable for a wheel this size is: Silicon 0.80 to 1.00 per cent, manganese 0.60 per cent, sulphur 0.10 per cent, phosphorus as low as possible. Typical cupola charge includes 50 per cent scrap car wheels and 50 per cent pig iron. The castings must be annealed thoroughly and should be lowered into the pit as soon as possible after they have been shaken out.

Expansion Scabs Make Trouble

Q.—We are having difficulty with expansion scabs on hand-rammed sewer pipe, and the defect generally produces leakers under pressure. Average sand strength is around 4.5 psi, permeability 8.0, moisture 7.5 per cent. Small additions of seacoal have made little if any improvement. We will appreciate any advice you care to offer. Is there a book on molding sand practice?

A.—Expansion scabs—that is, rough thin layers of metal partially separated from the body of the casting by a thin layer of sand, and held in place by a thin vein of metal—result from a number of causes, according to *Analysis of Casting Defects*. These include too high a moisture content, clay content too low for the grain type, too low in carbonaceous ma-

GANGWAY! By J. A. PATTERSON



"I can't figure out what it is, but there's something about that girl I kinda like!!"

terial, too low in hot strength, change in clay type without proper adjustment of percentage of clay used, and poorly conditioned sand. In your case it appears that the clay bond is too low, and the moisture somewhat high. Green sand compression strength is indicated as 4.5 psi, and it should be from 7 to 9 psi. Moisture content should be around 6 per cent. While you show the permeability as 8.0, we believe that you inadvertently put in a decimal point, and it actually is 80, which should be satisfactory.

So far as we know there is no book on preparation and control of molding sand. However, the book previously mentioned, *Analysis of Casting Defects*, includes many caused by sand conditions, and suggested remedies. It may be obtained from the book department of THE FOUNDRY for $4.25.

Term Is Based on Free Silica

Q.—In reading literature pertaining to the foundry industry we often see references to "acid" and "basic" linings for cupolas, and would like to know what the difference is.

A.—Distinction between acid and basic linings, refractories, slags, etc. in metallurgy is the amount of free silica available for combination with the basic oxides such as lime and magnesia. In other words, silica brick—which is practically all free silica—is highly acid while firebrick containing relatively small quantities of free silica are less strongly acid. Basic refractories include magnesite bricks, and crushed and burned magnesite and dolomite. Dolomite is a naturally found mineral composed of calcium and magnesium carbonates.

Silica brick are not used to any great extent in cupola linings except in a few instances in the melting zone since they spall and disintegrate under repeated heating and cooling as encountered in cupola operation. Since basic linings permit use of slags high in lime, they are receiving attention for lining of cupolas because such slags are quite effective in removing sulphur from the molten iron.

Cast Bushings in Metal Molds

Q.—Can you supply us with any information relative to the casting of bronze bushings in permanent or semipermanent molds. These are the usual 12-in. standard length of bushing in various outside and inside diameters. We understand that they are made with a sand core.

A.—Best suggestion we can give on producing solid or hollow bushings in metal molds is to follow the procedure described in *How To Make Improved Chill Cast Tin-Bronzes* published by Tin Research Institute. It points out that technical conditions for success are the use of a flux to remove reducing gases absorbed during melting by oxidation and simultaneously to dissolve harmful oxide skins. Use a controlled amount of deoxidant to remove excess oxygen before pouring. Control the method and rate of pouring to eliminate shrinkage cavities. Prepare molds and cores to prevent absorption of gas during the casting operation.

Flux recommended contains two parts sodium silicate (anhydrous, powdered, 1:3½), and one part cupric oxide or one and one-half parts black copper rolling mill scale. Preferably the two materials are mixed together, fused to a glass and crushed to suitable size. If the flux in powder form is used, it must be dried thoroughly before charging in the crucible. Flux is charged into the crucible with the metal, and the amount used is 2 lb up to 100-lb charge; 3¼ lb from 100 to 200-lb charge, and 4½ lb from 200 to 300-lb charge. After the metal is molten the flux is mixed in thoroughly, and the temperature raised to about 2300°F. Flux then is thickened by addition of dry sharp sand, and removed from the metal. The deoxidant (15 per cent phosphor-copper) is added, and the amount may range from 5 to 10 oz per 100 lb. This may seem high at first glance, but it must be remembered that the metal melted under the oxidizing flux contains oxygen which must be removed.

Pouring rates should be the minimum which will fill the mold completely without cold shuts. Critical rates depend upon size of the bushings, and on the tin and phosphorus contents. Rate of pouring is controlled by use of a refractory-lined pouring cup or tundish, preferably a clay-graphite type suitably drilled for the type of bushing. Solid sticks are poured through a single hole while cored bushings are poured with multiple streams spaced equidistant and midway between core and mold. Two holes are sufficient for bushings up to 2 in. external diam; four holes for 2 to 4 in.; six holes for 4 to 6 in. diam.

Recommended pouring rate is given by the formula R equals KP, where R is the pouring rate in lb per minute, P is the periphery of mold cross-section in in. In case of cored bushings use the periphery of mold plus periphery of core; for example, in the case of a 2-in. stick with 1-in. hole, P equals 2 times 3.14 plus 1 times 3.14 or 9.42 in. K equals a constant based on composition as indicated below:

Sn Content per cent	P Content, per cent Under 0.15 K	0.15 to 0.5 K	Over 0.5 K
3-7	2.6	1.9	1.6
7-12	1.9	1.6	1.3
Over 12	1.6	1.3	1.0

Pouring rates obtained with standard pouring apertures 1 in. long of the diameters shown, using standard temperatures:

Rate: lb per min.	32	16	12	10	8	6	4
Hole diam, in.	¼	3/16	5/32	9/64	1/8	7/64	3/32

Standard pouring temperatures are 2192 to 2282°F for phosphor bronzes; 2150 to 2240°F for gun metals and 2082 to 2192°F for leaded bronzes.

Mold and pouring cup should be positioned so that the metal does not strike either mold wall or core. Mold or core dressing should not provide a source of water vapor. Molds should be heated to about 212°F, and best results are obtained if mold wall is sprayed lightly with thick resinous-body aluminum

(*Concluded on page* 118)

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QUESTIONS and Answers

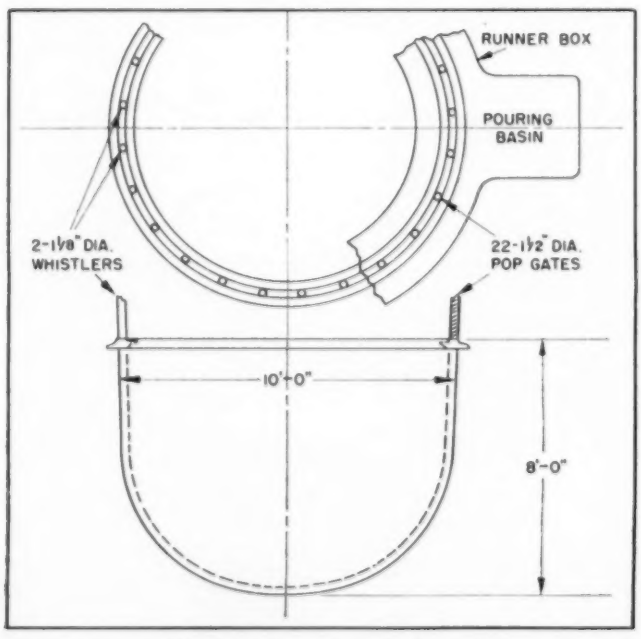
(*Continued from page* 116)

paint containing not less than 20 per cent aluminum.

Best core for cored sticks up to 2 in. internal diam is an iron rod with a smooth machined surface, tapered 1/32-in. on the diameter per ft. It is wrapped with one or more layers of asbestos paper to give a total radial thickness of 0.01-in. per in. diam of the core. Paper may be moistened with water gum or a core wash composed of 5 per cent aluminum powder, 2 per cent dextrine, and remainder water. It is sealed on with dextrine gum or with the core wash which is brushed thinly over the whole wrapped paper. Core must be baked for at least 15 minutes at 570°F or higher, and used while still rather warm. To remove the core, the casting is immersed in water which softens the paper. For larger cored castings, a cylindrical core without paper wrapping is used. Core is split into four segments, and a layer of asbestos paper ⅛-in. thick inserted between each segment at the outer ends. Core surface is dressed with the aluminum paint.

Metal Freezes in Many Gates

Q.—The accompanying sketch shows the usual gating system on a 10-ton caustic pot 10 ft diameter and 8 ft deep. Metal entered the mold through twenty-two 1⅛-in. pop gates equally spaced on the upper flange. Two show-ups or whistlers, 1⅛-in. diam, were erected at a point diametrically opposite the point where the metal first entered the pouring basin. The loam mold and core were well vented and in evidence during pouring. Metal was melted in a 66-in.-diam cupola and flowed continuously into a desulphurizing unit and into a 15-ton receiving ladle. Considerable agitation was noted in the metal flowing through an improperly dried spout for the first 15 minutes. Approximately 3 tons of metal was in the ladle before the agitation stopped. Metal temperature was 2770°F and pouring temperature was 2500°F. The gates froze before the mold was quite filled, resulting in a casting minus the top flange. Despite this condition it was possible to tap and drain the metal from the pouring basin into a ladle and pour it into a pig bed according to a usual custom. We shall appreciate an expression of opinion on this particular problem.



Method of gating caustic pot

A.—Molding, gating and pouring practice was similar to that observed in practically every foundry where castings of this kind are produced. Also in your foundry where similar castings have been made regularly over a period of many years. Therefore the mold may be dismissed as a possible factor in any attempt to solve the problem. Careful consideration seems to indicate that the temperature of the metal and the inevitable corresponding state of fluidity were the factors responsible for causing the defective casting.

Agitation in the wet cupola spout not only reduced the temperature in the first 3 tons of metal entering the ladle, but also, more importantly, filled it full of water vapor or hydrogen which changed its freezing and final structure characteristics. Although the remainder of the metal flowed into the ladle at 2770°F, it may be assumed that the addition did not raise the temperature of the layer of metal in the bottom of the ladle to a similar degree, nor change its characteristics, since it is well known that stratification easily occurs in ladles and metal baths.

Foundrymen are familiar with the fact that cold metal will form a skull in the bottom and on the sides of the ladle while the metal in the center and on the top still is sufficiently fluid to be poured over the lip of the ladle. Your tapping temperature reading of 2770°F and pouring temperature of 2500°F, were taken from the top surface of the metal and did not truly show the temperature at the bottom of the ladle. Consequently, the first iron from the ladle flowed readily through the circular runner basin, down through the 1⅛-in. pop gates and filled the greater part of the mold cavity without streaks or cold shuts. The colder iron from the lower part of the ladle did not flow as readily through basin and gates. In the comparatively wide and deep circular basin the metal was liquid enough to be tapped and poured into a pig bed. In the small gates the metal gradually solidified and cut off the flow into the casting.

To pour a 10-ton casting through twenty-two 1⅛ in. pop gates means that approximately 1000 lb of iron must flow through each gate. Hot or cold metal will flow much farther in large volume than in small volume. More metal can be poured through a pop gate than through a shallow horizontal gate, but even a pop gate has limitations. A man might pour 1000 lb, or for that matter several thousand pounds through a single small pop gate into a bulky casting, but he would not attempt to pour the same amount of metal through a single horizontal gate of the same cross-sectional area into a thin, flat casting. Metal constantly loses temperature between the furnace and the mold and passes fairly rapidly from peak temperature at the spout to a minimum temperature which will prevent it from flowing through small apertures.

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MEN of Industry

DAVID B. SHANNON has been elected vice president in charge of the Chattanooga, Tenn., and Somerville, N. J., plants of Somerville Iron Works, New Castle, Pa., subsidiary of Johnson Bronze Co. there. Mr. Shannon, a graduate of Georgetown University, served as chief process engineer, U. S. Rubber Co., Eau Claire, Wis., until 1943 when he joined Somerville Iron Works. Since 1944 he has been general manager of the Chattanooga plant, where he will continue to make his headquarters.

♦ ♦ ♦

Fred P. Biggs has been named president of the Brake Shoe & Castings Division, American Brake Shoe Co., New York. Mr. Biggs has served in various sales capacities since joining the company in 1916. In 1948 he was appointed first vice president of the Brake Shoe Division in addition to his duties as vice president in charge of sales of both Brake Shoe & Castings and Southern Wheel Divisions. **Stephen S. Conway** succeeds Mr. Biggs as vice president-sales of the two divisions. Mr. Conway joined the Chicago office of the Brake Shoe & Castings Division in 1912, became a sales representative in 1929, assistant vice president in 1944 and vice president in the sales department in 1947. **Ralph L. Robinson** has been appointed vice president of the Brake Shoe & Castings and Southern Wheel Divisions, with headquarters in Chicago. Since joining the company in 1928 he has served in sales positions and for the last three years has been assistant vice president of the two divisions, with headquarters in St. Louis. **Edward R. Anderson** has also been appointed a vice president of the Brake Shoe & Castings Division with headquarters in San Francisco. He joined the company in 1930, became sales manager of the Pacific Coast district in 1947 and vice president of the Kellogg Division in 1949.

♦ ♦ ♦

Hynes Sparks has been elected president, Symington-Gould Corp., Depew, N. Y., succeeding **Peter F. Rossman** who has resigned to accept an executive appointment with Hupp Corp., Detroit. Mr. Sparks attended University of Virginia and entered the Rochester, N. Y., plant of the company in 1919. He was transferred to the New York sales office in 1920, became manager of eastern sales in 1938, and has been vice president since 1942. With headquarters in the New York office he will continue in charge of general sales policies, spending part of his time at the manufacturing plants in Depew.

♦ ♦ ♦

Hermann P. Good, Textile Machine Works, Reading, Pa., and president of the Gray Iron Founders' Society, Cleveland, with Raymond L. Collier, the society's executive vice president, attended the annual meeting of the Joint Iron Council and the Council of Ironfoundry Associations, held in London Sept. 20-21. The visit, which was sponsored by the Economic Cooperation Administration, was a sequel to the recent visit of the British Gray Ironfounders Productivity Team to study technology of American foundry methods.

♦ ♦ ♦

Harold S. Falk, president of the Falk Corp., Milwaukee, was honored during the 51st annual convention of the National Metal Trades Association for his leadership in the field of labor-management relations. An award, an inscribed plaque, was given Mr. Falk "because of his energetic and forthright efforts in behalf of equitable working conditions, his pioneering in the development of foreman and apprentice training methods, his contributions to the field of industrial education in general, and his staunch help in formulating and supporting the association's major principle of establishing and preserving equitable working conditions."

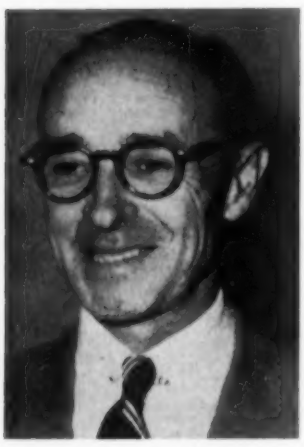
♦ ♦ ♦

Kenneth W. Lineberry has been elected president, Black, Sivalls & Bryson Inc., Kansas City, Mo., maker of foundry flasks, succeeding **A. J. Smith,** who has resigned. Mr. Lineberry until recently was vice president and a director of F. S. Yantis & Co., Chicago, and was associated with that company for 17 years.

♦ ♦ ♦

R. Lynn Ogden has been appointed superintendent of the Hess-Snyder Co., Massillon, O. This company now is engaged in jobbing and pro-

(*Continued on page* 122)



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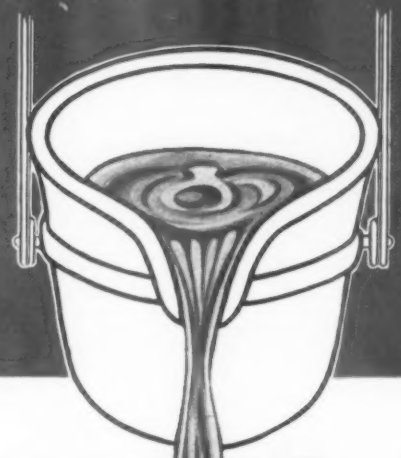

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MEN of Industry

(*Continued from page* 120)

duction work on gray iron castings. Mr. Ogden for many years was associated with Stockham Valves & Fittings, Birmingham.

♦ ♦ ♦

Scott B. Ritchie has been appointed vice president in charge of operations, United States Pipe & Foundry Co., Burlington, N. J., succeeding **Richard K. Haughton,** who has been named production consultant to the president. Mr. Ritchie was graduated from U. S. Military Academy, the Ordnance School, Army Industrial College, Army War College and Massachusetts Institute of Technology. For the last 30 years he has been engaged in engineering, manufacturing, maintenance and organizational activities similar to those required in his new position. Mr. Haughton joined United States Pipe & Foundry Co. following graduation from Stevens Institute of Technology. He served successively as draftsman, assistant foreman at the Addyston, O., plant, plant superintendent and resident manager of the North Birmingham, Ala., plant, until 1942 when he became vice president in charge of operations in Burlington.

♦ ♦ ♦

William C. Hookway Jr., formerly sales representative for the northern New Jersey area, Cooper Alloy Foundry Co., Hillside, N. J., has been appointed assistant to the chief engineer of the company. Mr. Hookway was graduated from Lehigh University and previously was associated with H. A. Wilson Co., Newark, N. J., and as a marine engineer with Gibb & Cox Inc. for 8 years. **James Ziegler,** until recently in the Pittsburgh - Cleveland district, has been transferred to the New Jersey territory of the company.

♦ ♦ ♦

Walter F. Craig Jr., formerly supervisor, Ferrous Metals Research, Armour Research Foundation, Chicago, has joined Climax Molybdenum Co. there as metallurgical engineer.

♦ ♦ ♦

Stanley H. Davis, who has been named chairman of the Western Michigan Chapter of the AFS for the year 1950-51, is in the sand research and x-ray department, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich. Mr. Davis was born in Linton, Ind., and was graduated from Rose Polytechnic Institute in 1931 with a degree in electrical engineering. During his college years he worked during the summers at Mohawk Mine, near Sullivan, Ind. Following two years with General Electric Co., Schenectady, N. Y., he joined the General Electric X-ray Corp., Chicago, in 1935. In 1941 he entered Campbell, Wyant & Cannon Foundry Co.'s x-ray department, later adding sand research to his duties there. Mr. Davis served as vice chairman of the Western Michigan Chapter last year.

♦ ♦ ♦

Donald E. Matthieu has been appointed metallurgist for the Alabama Pipe Co., Anniston, Ala., following his resignation as assistant to the superintendent of the Birmingham plant of the American Brake Shoe Co., New York.

♦ ♦ ♦

J. R. Munro has been appointed director of manufacturing, **C. A. Woodley,** general factory manager, and **W. L. Naumann** and **Lloyd J. Ely,** assistant general factory managers, of the manufacturing department, Caterpillar Tractor Co., Peoria, Ill. Mr. Munro, who joined the company in 1918 as an apprentice, has served as superintendent of diesel engine assembly and testing, factory manager of the tractor and engine division, and since 1942 as general factory manager. Mr. Woodley, who succeeds Mr. Munro, also started as an apprentice, in 1926, became machine shop foreman in 1934 and assistant general factory manager in 1945. Mr. Naumann finished his apprentice training in 1933, became assistant factory manager in 1942, and production manager in 1945. Mr. Ely, with the company since 1916, has served as general foreman of machine shops, assistant building superintendent, assistant factory manager of road machinery, and since 1942 as works manager of the Caterpillar Military Engine Co. in Decatur, Ill.

♦ ♦ ♦

Charles H. Parcells has been appointed instructor in metallurgical engineering at Illinois Institute of Technology, Chicago. Mr. Parcells received his bachelor of science degree in 1944 at Rensselaer Polytechnic Institute, Troy, N. Y., and was awarded his master's degree at Illinois Tech this past June. He has taught at the school's evening division for the past year, and for two years has been a metallurgical assistant at International Harvester Co.

♦ ♦ ♦

Carl H. Morken has been appointed plant manager in charge of foundry and fabrication shops, Donovan Inc., St. Paul. For the last year Mr. Morken has been engaged in industrial consulting work in Minneapolis. Prior to that he was head of his own company, C. H. Morken & Associates, Cleveland, engaged in the sale of foundry equipment and de-

(*Continued on page* 124)

SCOTT B. RITCHIE

WILLIAM C. HOOKWAY JR.

WALTER F. CRAIG JR.

STANLEY H. DAVIS

How to get finer Cores in 4 easy lessons:

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Foundry Supplies Co.
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J. H. Hatten
Lansdowne, Pa.

Schuler Equipment Co.,
Birmingham, Alabama

Independent Foundry Supply
Co., Los Angeles 11, Calif.

Marthens & Co.
Moline, Illinois

Carl F. Miller & Co.
Seattle 4, Wash.

Milwaukee Chaplet & Mfg.
Co., Milwaukee 15, Wis.

Porter Warner Industries, Inc.,
Chattanooga 2, Tenn.

Smith-Sharpe Co.
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Frederic B. Stevens, Inc.
Buffalo 12, N. Y.

Frederic B. Stevens, Inc.
Cleveland 14, Ohio

Frederic B. Stevens, Inc.
Detroit 26, Mich.

Frederic B. Stevens, Inc.
166 Brewery Street
New Haven 11, Connecticut

Western Industrial Supply Co.
208 S.E. Hawthorne Blvd.
Portland 14, Oregon

MEN of Industry

(*Continued from page* 122)

sign of production patterns and coreboxes. Following graduation from University of Minnesota, Mr. Morken was associated with Detroit Electric Furnace Co., Detroit, Ohio Brass Co., Mansfield, O., Carondelet Foundry Co., St. Louis, and Centrifugal Casting Co. Inc., Bluffton, Ind. During the war he served as technical consultant on the staff of the chief of ordnance, War Department. He is a past chairman of the St. Louis District Chapter, AFS.

♦ ♦ ♦

Maurice N. Trainer has been elected president, American Brake Shoe Co., New York, succeeding **William B. Given Jr.,** who has been named chairman of the board of directors. Mr. Trainer, a graduate of University of Pennsylvania, joined the company in 1916 as a brake shoe inspector. He progressed through the sales departments and in 1938 became president of the Brake Shoe & Castings Division. He has been first vice president of the company since 1943, a director since 1944, and is also president of Dominion Brake Shoe Co. Ltd., a Canadian subsidiary. Mr. Given joined the company in 1911 as secretary to the president. Following Army service in World War I he returned to the company, became assistant vice president in 1919, vice president in 1921 and president in 1929.

♦ ♦ ♦

William K. Mitchell, for the last 4 years a partner in the foundry supply firm of L. W. & W. K. Mitchell, Indianapolis, has been appointed public relations representative for the Delco-Remy Division, General Motors Corp., Anderson, Ind. Following graduation from Butler University, Mr. Mitchell was engaged in newspaper work in Indianapolis until he joined the public relations staff on GMC with headquarters in New York. Following four years of service with Army Infantry and Signal Corps he entered the foundry supply partnership. Mr. Mitchell has been an active member of the Central Indiana Chapter of the AFS, which he has served as a director and chapter reporter.

♦ ♦ ♦

Jack F. Secor, Indiana-Michigan representative, the Hill & Griffith Co., Cincinnati, is the newly elected chairman of the Central Michigan Chapter of the AFS. Mr. Secor served his foundry apprenticeship with Rudy Furnace Co., Dowagiac, Mich., from 1933 to 1936. The following year he joined Clark Equipment Co., Buchanan, Mich., where he spent 6 years in charge of sand control and later was named assistant to the general foreman. He became associated with Hill & Griffith Co. in 1946. Mr. Secor was a director of the Central Michigan Chapter the last two years.

♦ ♦ ♦

Herbert H. Klein, formerly sales manager, and **Milton A. Meier,** formerly Detroit office manager, have been elected vice presidents, L. A. Cohn & Bro. Inc., Chicago, producers of nonferrous alloys for smelting.

♦ ♦ ♦

C. R. Maxon, Market Development Division, the New Jersey Zinc Co., New York, has been presented with the first annual Doehler Award of the American Die Casting Institute, New York, to be made each year for outstanding achievement contributing to advancement of the die casting industry. The award was a popular recognition of Mr. Maxon's accomplishments while working with federal agencies in Washington and the Canal Zone in proving the suitability of die castings to meet existing government specifications.

♦ ♦ ♦

R. J. Swartout, vice president, Belle City Malleable Iron Co. and its subsidiary Racine Steel Castings Co., Racine, Wis., has been elected a director. Mr. Swartout has been associated with the companies since 1919. From assistant sales manager he advanced to sales manager and became vice president in 1943.

♦ ♦ ♦

Edward J. Sherrill has been appointed sales manager for pig iron, Ore Trading Corp., New York. Mr. Sherrill was formerly assistant general superintendent, Jessop Steel Co., Washington, Pa. Prior to that he was superintendent of production scheduling, Wickwire Spencer Steel Co., Buffalo.

♦ ♦ ♦

Mildred Kosar has been appointed executive secretary of the Chicago Foundrymen's Association, a newly created position. The post of executive vice president, occupied the past 4½ years by Col. Garrit C. DeHeus, who died Aug. 3, has been declared vacant by the organization's board of directors. Prior to affiliating with the association 3 years ago as secretary to Col. DeHeus, Miss Kosar spent 5 years with Foote Bros. Gear & Machine Corp., Chicago, in secretarial capacities in the personnel, industrial relations and sales departments.

♦ ♦ ♦

Fred A. Kaufman has been appointed general sales manager, the McKay Co., Pittsburgh, succeeding **Fred C. Smith** who has been named

(*Continued on page* 126)

WILLIAM B. GIVEN JR.

MAURICE N. TRAINER

WILLIAM K. MITCHELL

JACK F. SECOR

GOOD DEAL!
METAL BLAST's trial-order-guarantee
makes it easy for you to try
SUPER-ANNEALSHOT
the finest malleable abrasive
GUARANTEE
METAL BLAST makes this guarantee on all trial order shipments of SUPER-ANNEALSHOT and GRIT: If you don't agree they're the most efficient, most economical malleable abrasives you've ever used, or if in any way you are not completely satisfied—return the un-used quantity for refund—AT OUR EXPENSE.
If you haven't yet tried SUPER-ANNEALSHOT—you certainly should! You'll find it TOPS IN QUALITY—round, clean, perfectly screened shot—no "tails," no "hollows." Highly annealed to a malleable stage in automatic, scientifically-controlled furnaces. Cleans as fast as ordinary chilled shot—yet lasts twice as long. Slashes maintenance costs 80%.
SUPER-ANNEALSHOT is mass-produced to keep costs down—and the savings are passed along to you in the form of lower prices.
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Malleable
SUPER ANNEALSHOT
METAL BLAST, INC.
CLEVELAND OHIO
METAL BLAST, INC.
872 East 67th Street • Cleveland 3, Ohio

MEN of Industry

(*Continued from page* 124)

special assistant to the president. **E. H. McGraw** has been appointed eastern district sales manager with headquarters in New York city.

• • •

Frank P. Volgstadt, chairman of the Northwestern Pennsylvania Chapter of the AFS for the year 1950-51, is assistant plant manager, Griswold Mfg. Co., Erie, Pa. Mr. Volgstadt joined the company in 1934 as an aluminum polisher and served an apprenticeship in molding and metal handling. He later became foreman of the aluminum foundry, foreman of the aluminum heat treating and gray iron side floor department, and assistant to the foundry superintendent. He was appointed foundry superintendent in 1946 and in 1949 was advanced to assistant plant manager, assisting in the domestic sales division. Mr. Volgstadt served as vice chairman of the Northwestern Pennsylvania Chapter last year.

• • •

Lloyd E. Young has been appointed sales manager, Superior Steel & Malleable Castings Co., Benton Harbor, Mich. Mr. Young has a background of 22 years of experience in the foundry industry, covering production, supervision, management and sales.

• • •

James P. Kinney, former partner in Gordon & Kinney Inc., Detroit, has been appointed general sales manager, Philadelphia division, Yale & Towne Mfg. Co., New York, succeeding **Samuel W. Gibb** who has resigned. Mr. Kinney has had over 20 years of experience in the materials handling field.

Ernest A. Hund has been named president of the recently organized Push-Button Foundry Equipment Division, W. G. Reichert Engineering Co., Newark, N. J. Mr. Hund, who has been associated with foundry modernization and mechanization for over 25 years, was previously associated with Allis-Chalmers, Milwaukee, Barber-Greene Co., Aurora, Ill., Link Belt Co., National Engineering Co., Beardsley & Piper Division of Pettibone Mulliken Corp., Lester B. Knight & Associates Inc., and Productive Equipment Corp., all of Chicago.

• • •

Lee O. Witzenburg has been appointed sales manager, Cleveland Worm & Gear Co., and its subsidiary, the Farval Corp., both of Cleveland. Mr. Witzenburg, a graduate of University of Nebraska, was formerly associated with the V-belt Division, Gates Rubber Co., Denver, and more recently was sales manager of the Tann Corp., Detroit.

• • •

R. A. Haworth has been named manager of the Dallas, Tex., district sales office, Cutler-Hammer Inc., Milwaukee. Mr. Haworth joined the company in 1934 following graduation from University of Wisconsin. He served in the New York and Philadelphia district sales offices and since 1936 has been manager of the sales office in Baltimore.

• • •

William F. Winemiller, formerly refractories engineer in the Detroit area, has been named chief sales engineer, Refractories Division of Norton Co., Worcester, Mass. Other changes in the Refractories Division include: **Eugene A. Fischer** has been appointed refractories engineer for New England and part of New York state with headquarters in Worcester; **Murner E. Thor** will work out of Buffalo, covering eastern Canada and part of New York state; and **David G. Bolon,** with headquarters in Detroit, has been named refractories engineer in Indiana and part of Michigan.

• • •

Benjamin Sampson recently was appointed general sales manager, K. H. Huppert Co., Chicago, manufacturer of electric laboratory and industrial furnaces and ovens. Mr. Sampson formerly was district sales manager of Stewart Furnace Division, Sunbeam Corp., Chicago; and more recently was manager of the Industrial Furnace and Oven Division, Claud S. Gordon Co., Chicago.

• • •

Gordon W. Johnson, formerly chief metallurgist, American Hoist & Derrick Co., St. Paul, has been named supervisor of foundry process research, Armour Research Foundation, Illinois Institute of Technology, Chicago. Mr. Johnson was graduated from University of Minnesota in 1938, when he joined American Hoist & Derrick Co. In his new position he will supervise research projects in casting techniques and other foundry problems.

• • •

R. J. Vanden Heuvel has been named general sales manager, Milwaukee Chaplet & Mfg. Co., Milwaukee. Mr Vanden Heuvel has been associated with the company for 5 years.

• • •

Richard H. Diesel has been appointed director of purchasing, Stamford, (Conn.) Division, Yale & Towne Mfg. Co., New York, succeeding **A. B. Nordin Jr.,** who resigned. Mr. Diesel headed the Philadelphia and New York sales offices of Sargent & Greenleaf, Rochester, N. Y., until 1939, when he joined

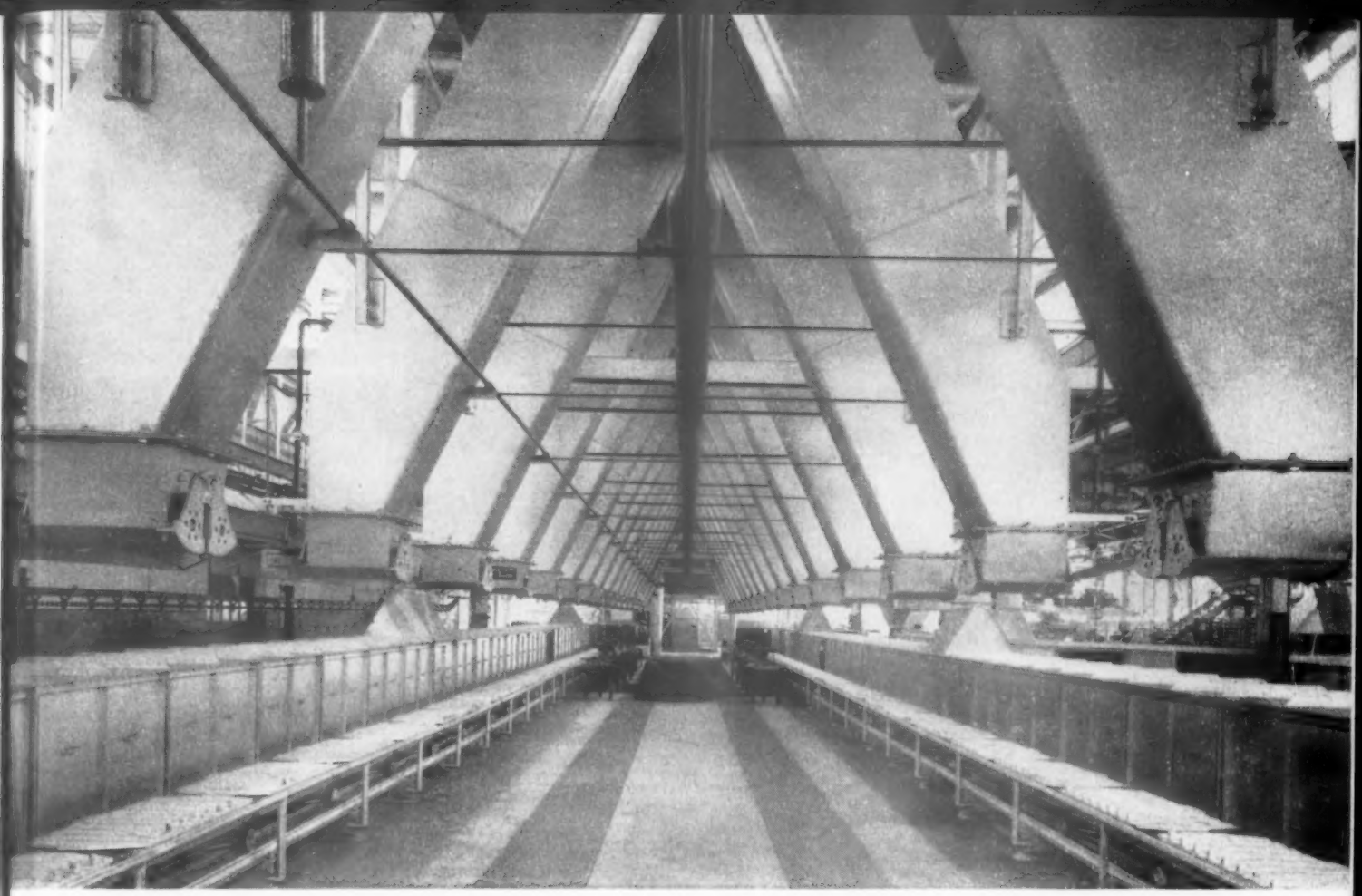
(*Concluded on page* 129)

FRANK P. VOLGSTADT

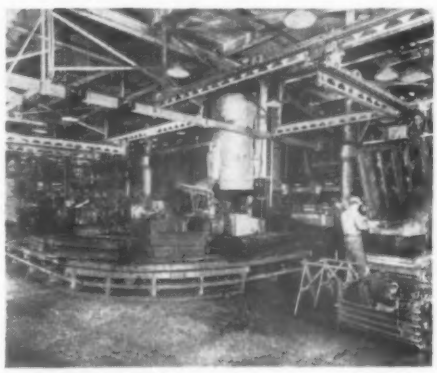
LLOYD E. YOUNG

JAMES P. KINNEY

ERNEST A. HUND



Above: Molder's Hoppers and Continuous Mold Conveyors in Large Mid-Western Foundry.



Sand Slinger Molding Unit Showing Continuous Mold Conveyor and Side Wall Shakeout.

Mecnanized Jobbing Foundry Equipped with Car Type Mold Conveyor.

Mechanization

benefits everyone

● Mechanization synchronizes and coordinates all operations in the foundry. It minimizes bottlenecks, delays and lost time. Output per unit of floor space is much increased. Lost molds and reject castings are much reduced. Foundries become better, cleaner, healthier places in which to work, attract a higher grade of workmen. Labor turnover is reduced and casting costs are cut, sometimes by as much as 33⅓%.

Consult Bartlett-Snow, engineering specialists in mechanizing continuous production and jobbing foundries since 1914. The C. O. Bartlett & Snow Company, 6201 Harvard Avenue, Cleveland 5, Ohio.

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ENGINEERS

BARTLETT-SNOW
CLEVELAND 5, OHIO

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ERECTORS

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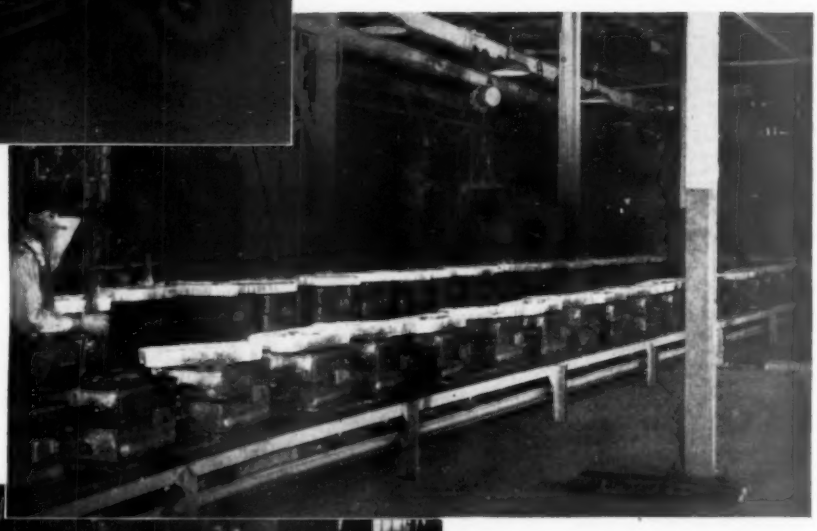


THESE photos show "Industrial" flasks in actual operation at prominent foundries in the United States and Canada. Names on request.

Write for catalog

I.F.I.

INDUSTRIAL FABRICATING, INC.

817 HALL STREET • EATON RAPIDS, MICHIGAN • TELEPHONE 6781

IN CANADA: Don Barnes Foundry Supplies & Equipment 42 James Street, South, Hamilton, Ontario

(*Concluded from page* 126)

Yale & Towne. He has served as manager of lock sales, assistant general sales manager, production manager, and since March 1950 has been executive assistant to the general manager.

♦ ♦ ♦

Richard E. Krafve has been named general manager of the Defense Production Division recently created by Ford Motor Co., Dearborn, Mich., to co-ordinate all defense and mobilization planning for the company. **Robert E. Busey** has been appointed chief engineer of the division, in charge of design and product engineering.

♦ ♦ ♦

Herbert J. Rosen, president, Griffin Wheel Co., Chicago, recently completed 50 years of service with the company. Mr. Rosen, who joined the company in Denver, served in executive capacities in various plants. He was named a director and vice president in 1943, executive vice president in 1945, and has been president for the past two years.

♦ ♦ ♦

Paul L. Eness has been appointed to the staff of the Product Development Laboratory, Acheson Colloids Corp., Port Huron, Mich., succeeding **D. G. Weaver,** who has been transferred to the company's offices in Newark, N. J. Mr. Eness has been engaged in research work on organic materials since graduation from University of Michigan, most recently at Battelle Memorial Institute, Columbus, O.

♦ ♦ ♦

J. E. McQuaid, formerly Seattle branch manager, Electric Steel Foundry Co., has been appointed sales manager of the Contractor's Equipment Division, in the Portland, Oreg., home office of the company, effective Dec. 1. **Wilson V. Latimer,** for the past several years assistant manager in the Seattle office, succeeds Mr. McQuaid there as manager.

♦ ♦ ♦

Alfred D. Jenss has been appointed district manager of the Cincinnati office of Ampco Metal Inc., Milwaukee. Mr. Jenss, who joined the company 9 years ago, until recently was a field engineer in the Milwaukee district.

♦ ♦ ♦

Corbin H. Myers has been appointed superintendent of industrial engineering, and **David M. Sowle,** superintendent of industrial relations, at the Torrance, Calif., plant of National Supply Co., Pittsburgh. Mr. Myers, a graduate of University of Cincinnati, joined the company in 1947 as an industrial engineer and until his new appointment was supervisor of the Standards Department. Mr. Sowle attended University of Wisconsin and University of California. He has been with the Torrance plant since 1946 and has been employment manager for the last two years.

♦ ♦ ♦

D. Gray Weaver, formerly in the Product Development Laboratory, Acheson Colloids Corp., Port Huron, Mich., has been transferred to the Newark, N. J., office where he will assist in co-ordinating technical and research problems involving Acheson Colloids Corp. and Acheson Colloids Ltd. of London.

♦ ♦ ♦

M. M. York has been named manager of the Boston district office, Allis-Chalmers, Milwaukee. Mr. York joined the company in 1939 following graduation from North Carolina State College. Following a period of training he was assigned to the Charlotte, N. C., office in 1941.

♦ ♦ ♦

John Munro Jr., vice president, the Whiting Corp., Harvey, Ill., has been named president of the Illinois State Chamber of Commerce. Mr. Munro, who has been a director of the organization since 1945, was recently chairman of its personnel and labor relations committee.

♦ ♦ ♦

Joseph J. Democh has been appointed foundry superintendent, Westlectric Castings Inc., Los Angeles. Mr. Democh was formerly associated with Michigan Steel Castings Co., Detroit and Symington-Gould Corp., Rochester, N. Y.

♦ ♦ ♦

A. W. Anderson has been appointed Pittsburgh district sales representative, Ohio Steel Foundry Co., Lima and Springfield, O., succeeding **Harry S. Ransome,** who has retired.

♦ ♦ ♦

John R. Vogt, formerly assistant metallurgist at the Detroit plant of Bohn Aluminum & Brass Corp., has been named metallurgist at its South Haven, Mich., plant.

♦ ♦ ♦

P. L. Edwards has been appointed central district manager, Manhattan Rubber Division, Raybestos-Manhattan Inc., Passaic, N. J., with headquarters in Pittsburgh, succeeding **R. C. Rice** who has retired from active service with the company.

MEN of Industry

Cupola Operation Authority To Aid Readers

BERNARD P. MULCAHY, president, Fuel Research Laboratory Inc., Indianapolis, has become a member of the advisory staff of THE FOUNDRY. An authority on cupola operation and foundry coke, Mr. Mulcahy will assist the editors to answer questions sent this publication concerning these subjects.

Prior to establishing his consulting business in cupola operation and coal carbonization four years ago, Mr. Mulcahy for ten years was research engineer, Citizens Gas & Coke Utility, Indianapolis. He was graduated from the University of Illinois in 1925, served as chemist and chemical engineer with the Associated Gas & Electric Co., Geneva, N. Y., in the by-product coke department, and as chief chemist for the Indiana Consumers Gas & By-Product Corp., Terre Haute, Ind. Mr. Mulcahy has been a member of various committees of the American Society for Testing Materials, American Coke & Coal Chemicals Institute and American Gas Association, and served on the Cupola Research Committee of the American Foundrymen's Society. He is a past chairman of the Central Indiana Chapter of the AFS.

BERNARD P. MULCAHY

MAN·TO·MAN on the Molder's Bench

"Another Day—Another Dollar"

By RALPH L. LEE

SOMETIMES I think that what most people consider to be talent is nothing more than the ability to stand up under what most people consider to be unbearable monotony.

A foundry friend of mine, and a very good one—in fact, one of the best I've got—has told me a number of times that he sort of envies me the way I seem to get such a bang out of even the hardest work up in the Lee Hobby Foundry. The first time he mentioned it I was honestly surprised. I said, "Why Jack, you get a kick out of *your* work, don't you? I always imagined you did."

"No Ralph," he said, "to tell you the truth, I can't say that I particularly enjoy the work itself. Not just the doing of it, it's getting the work done and out of the way—that's what I like."

This chat took place while I was working on a goldberg molding machine idea I'd had for quite some time. Jack had been very much taken up with it; in fact, he'd been playing along with me on the project from the very start.

When the idea first came to me I really got excited about it, and most of my foundry friends got excited, too, when I told them about it. I had whipped up a little tryout model in short order and, unfortunately, it worked too well the first time. I say unfortunately because I got so hopped up with the first results I went around telling everybody and their uncle and feeling like Edison the second, not knowing all of the tough nuts there were in store for me to crack when I really got into the thing.

Jack was right at my shoulder when I planned the first full-size working model, and he put in his oar every now and then with a darned good suggestion. And I'll say this, that he and I were pretty much satisfied with the way we had decided I should build the new rig. But I know for a fact that he had more ants in his pants than I had wanting to see the contraption all together ready for tryout. As usual, the ideas we were most certain about backfired on us and the one we had the most doubts about came through with flying colors. While the night-before-Christmas excitement we had over the original idea simmered down considerably, we still were sure that we had something well worth while.

Since both Lee Hobby Foundry and the goldberg project were off the bread-and-butter job activities, I think Jack chomped at the bit considerably over the snail's pace progress we were making. At the present writing I believe there have been at least six major turn-about-face back trackings and rebuilding which have dragged the project out over at least three years. I wouldn't be surprised that it was the thick-skinned way in which I sort of smacked my lips and rubbed my hands together each time I tackled the next lap that caused Jack to bring up this subject of work attitude.

I guess it must have been my seeming ability to get two separate kinds or brands of satisfaction out of the work that impressed him. First, the satisfaction of going through the motions of making sketches and drawings, the building of patterns, conditioning the sand, making molds, the melting, pouring, the cleaning, machining and assembly. Second, the anticipated satisfaction, looking forward to the day when the machine finally does what we had hoped it would.

Sometimes on my travels as I see the bored look on so many of the faces of the herds of people pouring out of stores, offices, factories and foundries at quitting time, I can't help but think what a hell on earth it must be to work from morning till night and day after day with the only bright spot in the whole deal being the measly little old pay check.

Slaving along day after day solely on the basis of imaginary satisfactions to come strikes me as being just about as practical as trying to live on meals made up of imaginary bread, meat and potatoes. *Unless a man finds in his work not only a means of earning a living but a reason for living he's only half alive.*

I'm definitely convinced that we've got to have two sets of satisfactions—*One set which pays off when we finally get where we're going* (if any) and the other *cash and carry* (as we go along). In my humble opinion the first comes as a bonus on the second in nine cases out of ten.

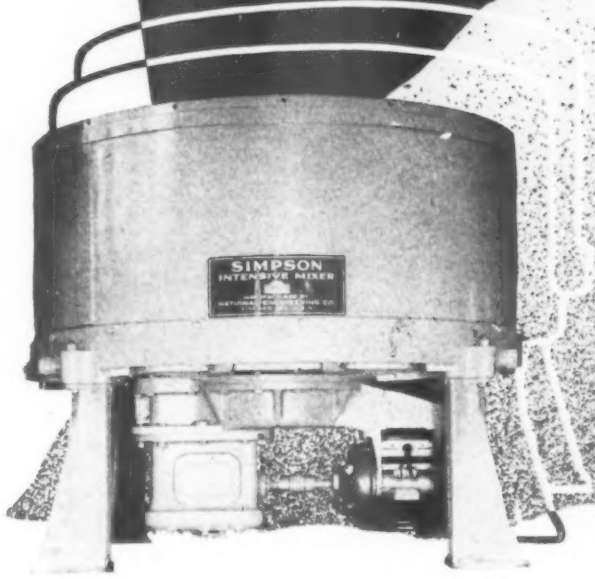
I just can't dodge the conclusion that, in any worthwhile work like ours in the foundry business, it is perfectly possible for any one of us to get our heads screwed on straight to the viewpoint where, without thinking of the future, we can get a very real satisfaction out of going through the motions of the daily jobs, by practicing these motions to a point nearing perfection—at least where they will pay off each day as we go along.

With this viewpoint I know for a fact that some organizations pay off better in this form of cash than others. And while I guess there is no foolproof recipe for bringing it about,

(*Concluded on page* 133)

150,000 TONS OF SAND

Prepared in 3 SIMPSONS WITHOUT REPLACING A SINGLE PLOW OR OTHER MIXER PART!



. . . another case where RUGGED MIXER DESIGN plus PREVENTIVE MAINTENANCE *paid off!*

HERE'S an excellent example of the results you can get by following a simple *preventive maintenance* program: In one year's time, three No. 3 Simpson Mixers, installed in a large eastern malleable foundry turned out 150,000 tons of properly prepared molding sand, without replacing a single plow or other mixer part! Their preventive maintenance program was simple . . . they spent just 30 minutes a day cleaning and greasing each mixer, checking the plow settings, and adjusting them if necessary.

This enviable record is based on the production capacity of 90 tons per hour for all three mixers, each handling 3000 lb. batches. These 3 mixers are all controlled by National Time Masters, requiring only 1 mixer operator.

In addition, this foundry has also operated two No. 2 Simpson Mixers in their Core Room since May 1948 *without replacing a mixer part of any kind!*

This is just one of many similar installations wherein *preventive maintenance* added to the rugged design of Simpson Mixers has resulted in better sand control—more uniform results—top efficiency—and tremendous savings in maintenance costs.

Are you taking advantage of this kind of performance? If not, let us discuss your mixing and sand handling problems with you. Write for further details.

SIMPSON Intensive MIXERS

NATIONAL *Engineering Company*

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Manufacturers and Selling Agents: For Continental European Countries—George Fisher, Ltd., Schaffhausen, Switzerland; for British Possessions—August's Limited, Halifax, England; for Canada—Dominion Engineering Co., Ltd., Montreal; for Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd., Sydney; for Argentina, Brazil and Uruguay—Equipamentos Industriais EISA Ltda., Sao Paulo, Brazil; for Mexico—CASCO, S. De R.L., Mexico, D.F.

● Easy does it with Smith L-O Core Oil holding that sand together firmly and uniformly. Core making is faster, simpler, more accurate . . . baking time is reduced . . . desired flexibility without excess breakage is maintained all along the line. • Produced from highest quality materials by exacting standards and through the Dow-Therm method of heat treatment, Smith L-O is preferred by large and small foundries doing all classes of work. • Get in the swim with Smith L-O . . . the right binder for getting jobs done right!

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- MALCOLM G. STEVENS — Arlington, Massachusetts
- PACIFIC GRAPHITE CO., INC. — Los Angeles 22, California
- TERMINAL WAREHOUSE — Worcester 8, Massachusetts
- M. W. WARREN COKE CO. — St. Louis, Missouri
- WESTERN FOUNDRY SAND CO. — Seattle, Washington
- WESTERN INDUSTRIAL SUPPLY CO. — Portland 14, Oregon

Smith L-O Core Oil

ROD DIP LIQUID PARTING

SMITH OIL & REFINING CO.
MANUFACTURERS OF L-O AND CERTIFIED CORE OILS
INDUSTRIAL OILS DIVISION . . . ROCKFORD, ILLINOIS

(*Concluded from page* 130)

I'd be willing to bet that any outfit that knew the value of this kind of pay, not only to each individual but to the outfit as a whole, would be able to work out their own scheme if they had a mind to.

We all know, of course, that, in spite of viewpoint, very few of us are spared a day now and then when we are fed up to the gills and don't give a damn whether school keeps or not, but I honestly believe—in fact, I know from actual experience—that they'll be fewer and farther apart trying at least to work on a cash and carry basis.

When I read this article over to Mother (that's my home superintendent, my vice president in charge) she said, "Why don't you tell them about Mrs. Watier whose daughter said to her that time, 'Mother you *always* have a good time no matter where you go' and how she answered, 'Why of course I do, I go expecting to have a good time'." After turning the idea over in my mind I said that while I thought it was a good suggestion I didn't think it was just the thing for this particualr purpose.

Publishes Safety Bulletins

National Safety Council, 425 North Michigan Ave., Chicago 11, has issued a set of six training booklets for foremen and supervisors, entitled "Psychology of Safety in Supervision," by Dr. J. L. Rosenstein, industrial psychologist. Under various titles the booklets cover the relationship of psychology to accident prevention including peculiarities common to human nature, importance of a supervisor's understanding quotient, teaching safety on the job, satisfaction of basic human wants by supervisors, teamwork in safety, and evaluation of habits, emotional biases and abilities by supervisors. Complete sets of the six booklets are offered to members of the National Safety Council at 90 cents per set, with special prices for quantity lots. Prices to nonmembers are higher.

Forms Export Units

Independent Pneumatic Tool Co., 175 State St., Aurora, Ill., manufacturer of portable power tools, has announced organization of two export corporations to operate sales and service branches in Europe and South America. Thor Tool Continental Inc., located in Antwerp, Belgium, will be operated under direction of Vance G. Turner, who for the last 3 years has been western Europe export representative with headquarters in Brussels. Thor Tool Hemisphere Inc., located in Sao Paulo, Brazil, will be under management of Donald E. Randall.

Meetings of Interest to Foundrymen

Nov. 2-3—Metals Casting Conference, sponsored by Purdue University with Central Indiana and Michiana Chapters of AFS, Purdue University, West Lafayette, Ind.

Nov. 2-3—Annual Conference on X-ray and Electron Diffraction, Mellon Institute for Industrial Research, Pittsburgh

Nov. 3—Malleable Founders' Society, eastern sectional meeting, Hotel Commodore, New York

Nov. 9-10—Meehanite Casting Manufacturers, annual convention, Hotel Knickerbocker, Chicago

Nov. 9-10 — National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago

Nov. 9-11—Steel Founders' Society of America, annual technical and operating conference, Carter Hotel, Cleveland

Nov. 10-11—Michigan Regional Foundry Conference, sponsored by Michigan AFS Chapters and Michigan State College, Michigan State College, East Lansing, Mich.

Dec. 1—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Dec. 7-9—Electric Furnace Steel Conference, sponsored by American Institute of Mining and Metallurgical Engineers, Hotel William Penn, Pittsburgh.

1951

Jan. 15-18—Plant Maintenance Conference and Show, Public Auditorium, Cleveland

Jan. 19—Malleable Founders' Society, semi-annual meeting, Hotel Cleveland, Cleveland

Jan. 22-26—American Society of Heating & Ventilating Engineers, exposition and annual meeting, Commercial Museum, Philadelphia

Feb. 8-9—Wisconsin Regional Foundry Conference, sponsored by Wisconsin Chapter of AFS and University of Wisconsin, Schroeder Hotel, Milwaukee

Feb. 22-23—Birmingham Regional Foundry Conference, Birmingham District Chapter and University of Alabama Student Chapter of the AFS, Tutwiler Hotel, Birmingham

Feb. 23—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Mar. 2—Malleable Founders' Society, eastern sectional meeting, Hotel Commodore, New York

Mar. 5-9—American Society for Testing Materials, committee week, Netherland Plaza Hotel, Cincinnati

Mar. 9-10—Ohio Regional Foundry Conference, sponsored by Ohio Chapters and Ohio State University Student Chapter of AFS, Case Institute of Technology, Cleveland

Mar. 19-23—Western Metal Congress & Exposition, Civic Auditoriums, Oakland, Calif.

Mar. 23—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Apr. 23-26—American Foundrymen's Society, annual convention, Buffalo

Apr. 27—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

May 18—Malleable Founders' Society, eastern sectional meeting, Hotel Commodore, New York

May 23-24—American Society for Quality Control, annual convention, Hotel Cleveland, Cleveland

May 25—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

June 18-22—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hotel, Atlantic City, N. J.

June 21-22—Malleable Founders' Society, annual meeting, the Homestead, Hot Springs, Va.

July 27—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Oct. 31-Nov. 2—Meehanite Casting Manufacturers, annual convention, Greenbrier Hotel, White Sulphur Springs, W. Va.

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Fig. 1. Blown core box is rolled on to Osborn Core Roll Over and Draw Machine.

Fig. 2. Drier plate is positioned and then pneumatically clamped to table by tripping machine control valve.

Fig. 3. Core box is rolled over and when the roll-over table is in position, the draw mechanism automatically rises, clamps are released and the core is drawn. The operator pushes the other box into the Core Blowing Machine during this automatic operation.

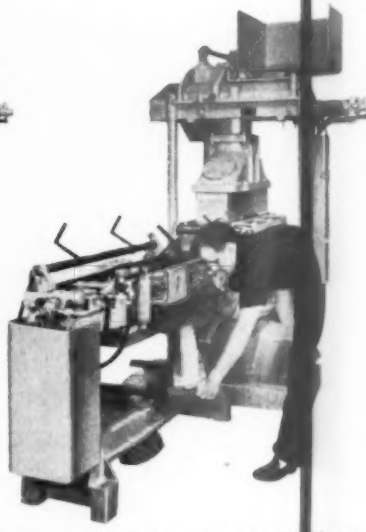

Fig. 4. After starting the Co Blowin Machine (equipped with automa ntrols the operator removes finished co d drie plate from the roll-over draw m e to th rack or conveyor while the core i being blown.

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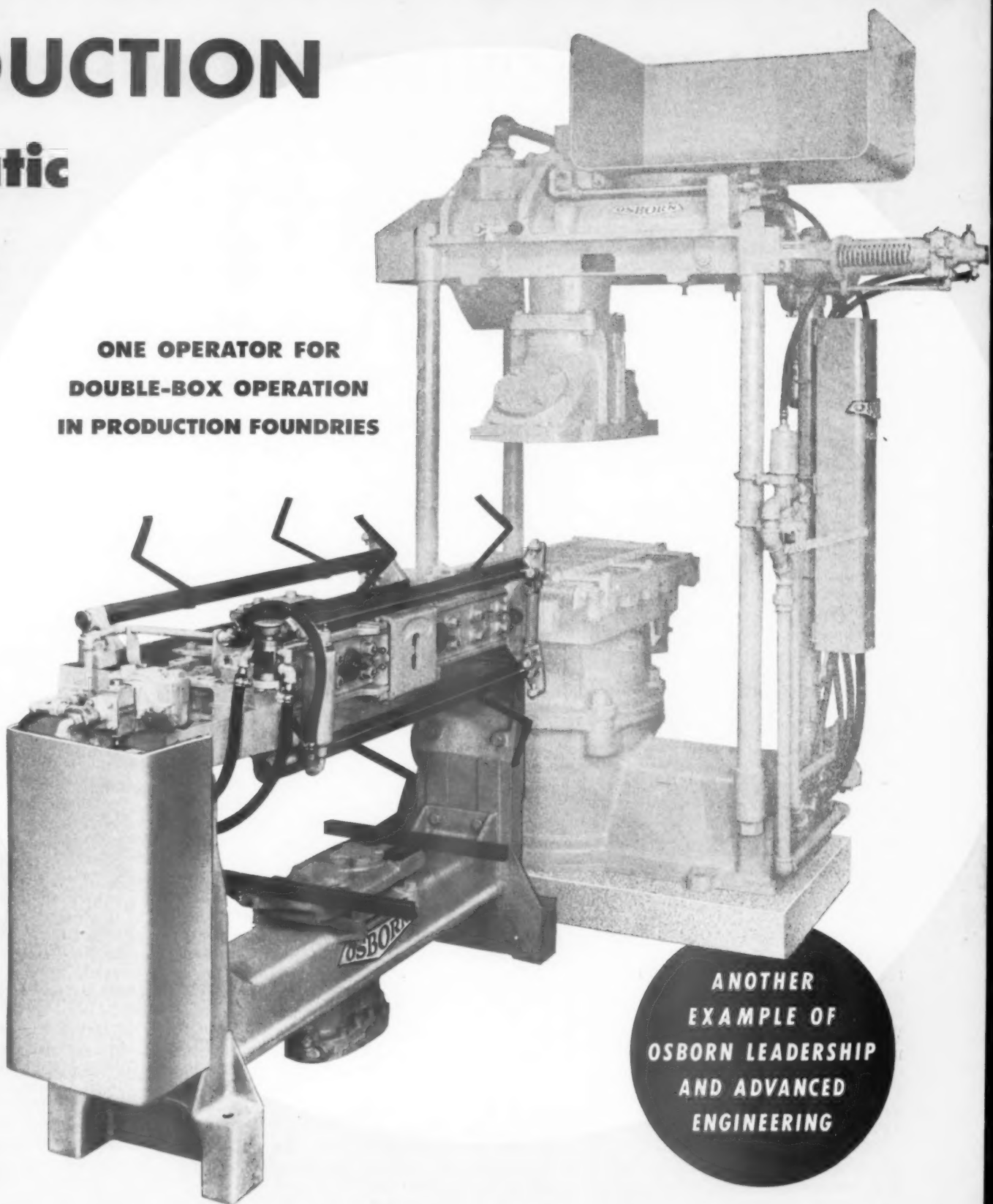

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TEXANS HOLD SUCCESSFUL CONFERENCE

At First Regional Gathering

By WILLIAM G. GUDE
Managing Editor
THE FOUNDRY

TEXAS foundrymen gathered at San Antonio, Oct. 5-6, for a successful regional conference, the first to be sponsored by the Texas Chapter and Texas A. and M. Student Chapter of the American Foundrymen's Society. The two-day meeting, held at the Plaza Hotel, had a registration of close to 140.

An interesting and well diversified program of technical papers arranged under the direction of James R. Hewitt, manufacturers' representative, chairman of the general conference and program committees, and Jake Dee, Dee Brass Foundry, Houston, program committee co-chairman, provoked considerable discussion at all of the individual sessions.

Two general meetings and 11 sectional sessions comprised the technical part of the program. In addition, a general luncheon meeting was held Thursday noon and three round-table luncheons, followed by technical discussions, Friday noon. The conference was closed with a banquet Friday evening. A highly enjoyable Texas barbecue, served Thursday evening at the delightful Lone Star Picnic Park, was the high light of the entertainment arranged for conference visitors. Entertainment following the barbecue was furnished by the Lone Star Steel Co.

Discusses Society Activities

Walton L. Woody, vice president, National Malleable & Steel Castings Co., Cleveland, and national AFS president, was principal speaker at the Thursday luncheon presided over by Chapter Chairman W. H. Lyne, Hughes Tool Co., Houston. Mr. Woody, introduced by Tom L. Shartle, president of Texas Electric Steel Casting Co., Houston, and the Steel Founders' Society of America, discussed some of the activities of the AFS.

The Friday evening banquet was the occasion for presentation of the first scholarships offered by the Texas Chapter. Marvin W. Williams, Hughes Tool Co., Houston, and past chairman of the chapter, made the awards to Fred L. Maxwell, senior management engineering student at Texas A. and M. College, and to Lloyd Howerton, senior mechanical engineering student at the University of Texas, both of whom have evidenced interest in foundry careers.

Principal speaker at the banquet, presided over by Chapter Chairman W. H. Lyne, was Dr. Harold Vagtborg, director, Southwest Research Institute. Dr. Vagtborg discussed some of the potentials for industrial and agricultural growth in the Southwest which seem likely to result in marked expansion in commerce and population of that area.

The opening session, devoted to the subject of patterns and coreboxes, had Arthur H. Stenzel, Stenzel Pattern Works, Houston, as chairman. Speakers were Albert F. Pfeiffer, Allis-Chalmers Mfg. Co., Milwaukee, and Harry J. Jacobson, Industrial Pattern Works, Chicago.

Mr. Pfeiffer gave a number of recommendations for the design and making of patterns that will assist the foundry in the most efficient production of castings. Points emphasized were illustrated by slides of a wide variety of patterns employed by Allis-Chalmers. He advocated building a model of new pattern equipment after blueprints are prepared. This gives the patternmaker, foundryman and engineer an opportunity to discuss the model and decide upon any changes necessary before the pattern is finally made. Also, records should be kept of the performance and use of patterns as a reference for future changes in design.

Mr. Pfeiffer suggested a means for increasing production of certain castings where patterns are to be mounted on one side of the matchplate, placing the mold cavity only in the drag. By mounting patterns on both sides of the plate, the number of castings can be doubled. A split core is used between cope and drag.

In discussing the problem of designing high-speed machinery to withstand the abrasive action of sand, Mr. Jacobson described the use of an expendable corebox. This box, made of an aluminum alloy instead of a steel-faced box, is cast in multiple from a master iron pattern. It is particularly adapted to high-production work and can be employed for production of a large number of cores before it is necessary to be discarded. Economy of its use makes replacement preferable to repair. It is equally adapted to production of core driers.

Three speakers answered the question "Does Core Blowing Belong in My Shop?" at the second general session. Malcolm J. Henley, Texas Foundries Inc., Lufkin, Tex., was chairman at this meeting. The general subject of coreblowing and the numerous factors involved in its successful application were discussed by Zigmond Madacey, foundry superintendent, Caterpillar Tractor Co., Peoria, Ill., L. P. Robinson, vice president, Archer-Daniels-Midland Co., Cleveland, and Lawrence D. Pridmore, International Molding Machine Co., LaGrange Park, Ill.

Mr. Madacey described a wide variety of cores currently being produced by machine, and illustrated a universal type blow plate developed to facilitate production involving frequent changes in coreboxes. He pointed out that sand mixtures containing less than 1.8 per cent moisture are too dry for desirable results, and that accurate sand control is necessary for successful practice.

Good Sand Practice Necessary

Mr. Robinson said that, in addition to the direct benefits of increased production, lower costs and more accurate cores resulting from core blowing, there is an indirect benefit in that slipshod sand practice cannot be tolerated. This means that faulty sand preparation methods, a possible source of defective castings, are eliminated. While a universal sand mixture is not adapted to all types and sizes of cores, Mr. Robinson recommended starting with 1 per cent by weight each of oil and cereal, then varying the composition as needs require.

Mr. Pridmore traced the history of core blowing and showed examples of different types of rigging for blowing a wide range of cores, as an indication of the versatility of the modern core blower. He urged the elimination of wires and rods from cores where possible, stating that often they do no good. Blowing cores, he pointed out, directs the sand fines to the outside of the box, leaving the more permeable sand in the middle. This aids carrying off of gases.

Recommendations for synthetic foundry sand practice were given in a talk by Clyde A. Sanders, vice president, American Colloid Co., Chicago, at a session presided over by W. H. Lyne, Hughes Tool Co., Hous-

(*Concluded on page* 138)

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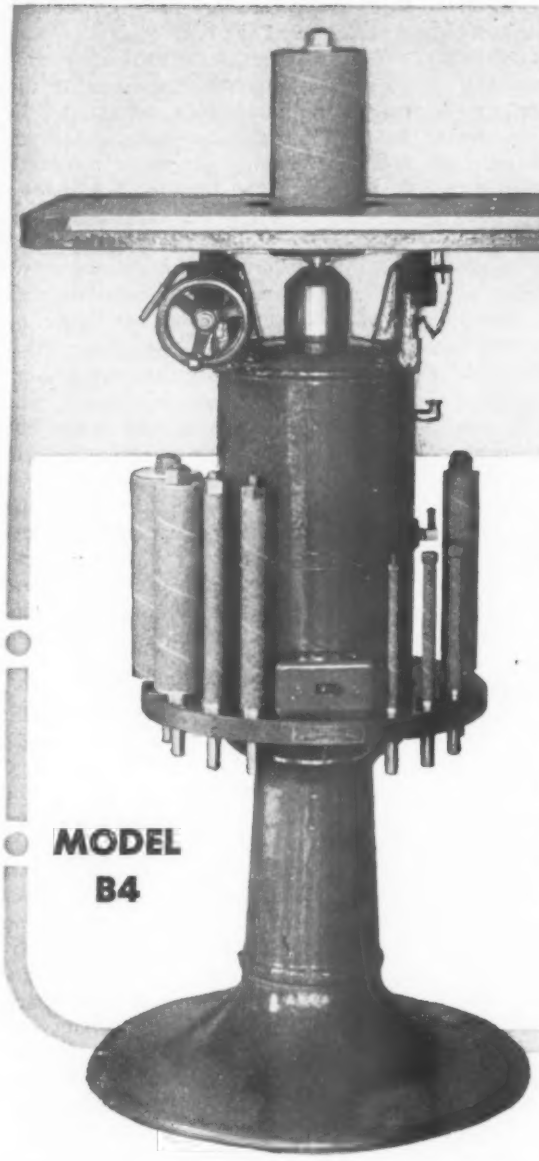

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(*Concluded from page* 136)

ton. Mr. Sanders cautioned against use of hot molding sand and suggested employing a sand supply five times the weight of metal poured daily. To prevent loss of fines, use of a water spray at the shakeout was recommended. Describing his study of the relationship between molding sand properties and metal shrinkage, Mr. Sanders said that sand with high flowability produces least shrinkage and mold deformation. Best results in casting finish and minimum shrinkage were obtained by adding 4 to 5 per cent seacoal or ½ per cent wood flour to the proper sand mix.

Another session on the subject of sand consisted of a general description of natural bonded sands by E. C. Sawyer, Ayers Mineral Co., Zanesville, O. C. R. McGrail, Texaloy Foundry Co., San Antonio, was chairman. Mr. Sawyer discussed mining, separation and blending methods of sand producers and detailed the properties and facilities of sand interests in the leading districts, including Albany, New Jersey, Ohio, etc.

Nodular Iron Use Growing

Applications for ductile or nodular iron castings are growing steadily, it was stated at one of the gray iron sessions by A. P. Gagnebin, International Nickel Co., New York. Robert C. Wittlinger, Pioneer Foundry, Houston, presided. Discussing the present status of that material, he said production this year will total 15,000 to 20,000 tons. It is not unlikely, he added, that eventually production will be exceeded only by that of gray iron castings and wrought steel.

The concluding gray iron session was devoted to cupola practice and had Wally W. Levi, metallurgist, Lynchburg Foundry Co., Radford, Va., as speaker. Chairman was John Kimes, Lufkin Foundry & Machine Co., Lufkin, Tex. Mr. Levi discussed fundamentals involved in efficient cupola operation, including recommendations for preparing the bed, making and placing metal and coke charges, and slagging. Influence of moisture in the blast, methods of carbon control and recent developments in use of basic lining in cupolas also were described.

The recently completed second edition motion picture of the AFS research study of fluid flow in transparent molds was presented at one session at which Charles Sibbitt, Refinery Castings Corp., Ft. Worth, was chairman. This color picture, recording further investigation of relationship of sprue, runner and gate to quality of light metal alloy castings, offered these conclusions: Keep the ladle lip low; fill sprue quickly; put the entire gating system on the pattern; use a tapered sprue and the smallest sprue possible; enlarge the sprue base; restrict the runner on either side of the sprue base; maintain the runner area four to six times that of the sprue bottom; make the cross-sectional area of the gates equal to that of the runner area; avoid abrupt changes in the area of the flow channel and avoid sharp corners throughout the flow channel.

Small foundries have no reason for expensive installations of complicated mechanized equipment, it was emphasized by L. G. Probst, engineer, National Engineering Co., Chicago. He recommended that foundries considering mechanization be guided in their decision by the estimated increase in production indicated, reduction in labor costs, and value of improved working conditions that results. The most economical and safest procedure is to start on a small scale, adding additional equipment from time to time, and paying for it through the savings resulting from its use. In illustrating various examples of sand handling installations, Mr. Probst stated that it has been possible to reduce the cost of such equipment in recent years through standardization of certain parts. Walter J. Temple, Kincaid-Osborn Electric Steel Co., San Antonio, was session chairman.

Aluminum Gating Practice

The first of three nonferrous technical sessions comprised a discussion of aluminum gating and risering practice by T. E. Kramer, William F. Jobbins Inc., Aurora, Ill. John G. Collier, Garrott Brass & Machine Co., Houston, was chairman. Mr. Kramer showed slides to explain experiences in difficult gating problems connected with production of various castings, as well as in overcoming defects with different types of sand and permanent mold aluminum castings.

In a general discussion of copper-alloy base casting practice, William Ball, R. Lavin & Sons, Chicago, cited the critical factors in making such castings as: Melting, correct pouring temperature, and correct size of heads and gates. John M. Bird, American Brass Foundry, Ft. Worth, was session chairman. Mr. Ball described the various types of brass and bronze, their application and yield. Since there is an optimum pouring temperature for each metal, he recommended that the temperature at which pouring is started be regulated by the time required to empty the ladle into a given number of molds. Consideration should be given to the fact that feeding and flowability of different alloys vary.

Melting practice in producing copper-base alloys was discussed at the concluding nonferrous session by R. A. Colton, metallurgist, Federated Metals Division, American Smelting & Refining Co., Barber, N. J. Jake Dee, Dee Brass Foundry, Houston, presided. Mr. Colton pointed out that certain fundamental practices must be observed in the melting department to produce good castings.

In general, he recommended: Use only clean, dry, uncontaminated melting stock in clean crucibles; melt rapidly with an oxidizing flame but avoid both excessive overheating and do not hold the metal at high temperatures; skim carefully; cool the metal to pouring temperature in the open air and avoid vigorous stirring just before pouring; use deoxidizers only in recommended amounts, and use a reliable, calibrated pyrometer.

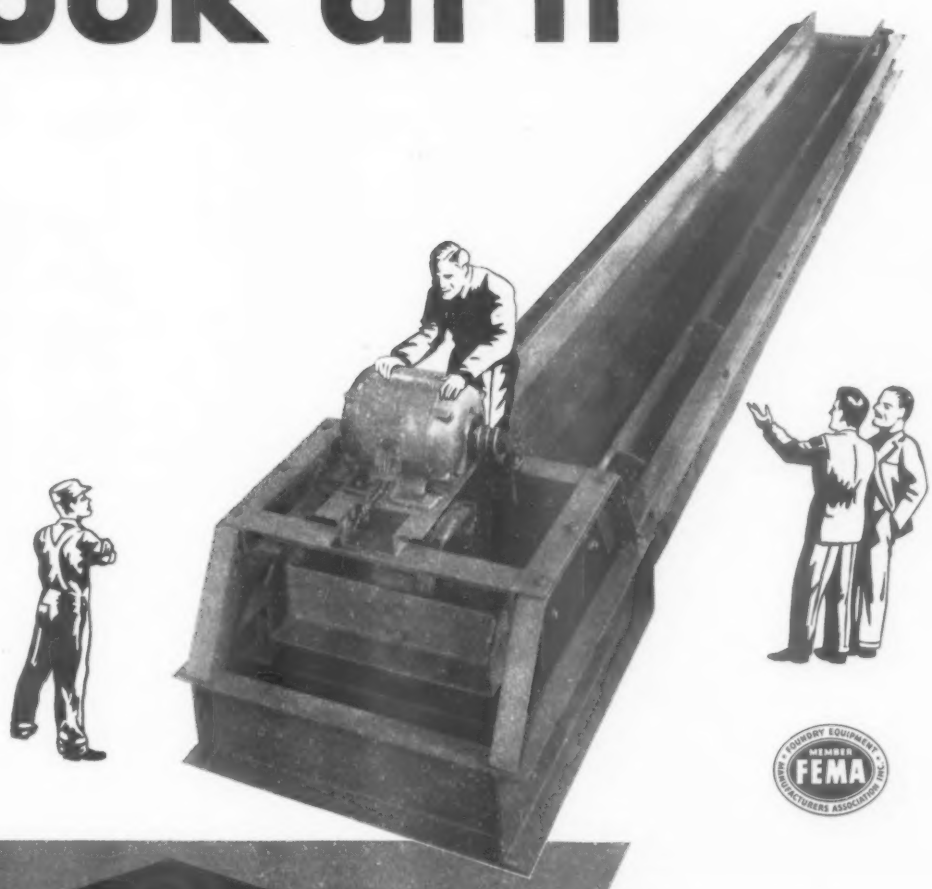
Alloy Steel Developments

A review of recent developments in alloy steel melting was given by E. A. Brandler, Electro Metallurgical Division, Birmingham, at one of the steel sessions, presided over by Burt Reynolds, Texas Steel Co., Ft. Worth. This included use of oxygen in cutting melting time of heats, effect of manganese on the deoxidation power of aluminum, effect of zirconium and titanium on intergranular sulphide when used as deoxidizers, and duplexing with the cupola and electric furnace.

Steel melting practice was discussed further at another session by James A. Bowers, American Cast Iron Pipe Co., with Gerald Smith, East Texas Electric Steel Co., Longview, as chairman. Mr. Bowers listed factors productive of the best tensile properties in electric steel, recommending that the meltdown be slightly oxidizing. As soon as melted, a high concentration of iron oxide should be produced to lower the residual silicon and manganese.

Discussing the relation between slag and manganese loss, Mr. Bowers said that the silicon content required for soundness increases with higher carbon content, but an excess amount may cause a reversion to pinhole porosity. Silicon in cast steel up to about 1 per cent improves strength with minimum sacrifice of ductility. By increasing silicon instead of using aluminum, cast steel of superior ductility for a given strength is obtained. Regarding hydrogen concentration, it was explained that metal chemistry has considerable effect on hydrogen absorption and the ease with which it escapes from solidified metal.

every way you look at it



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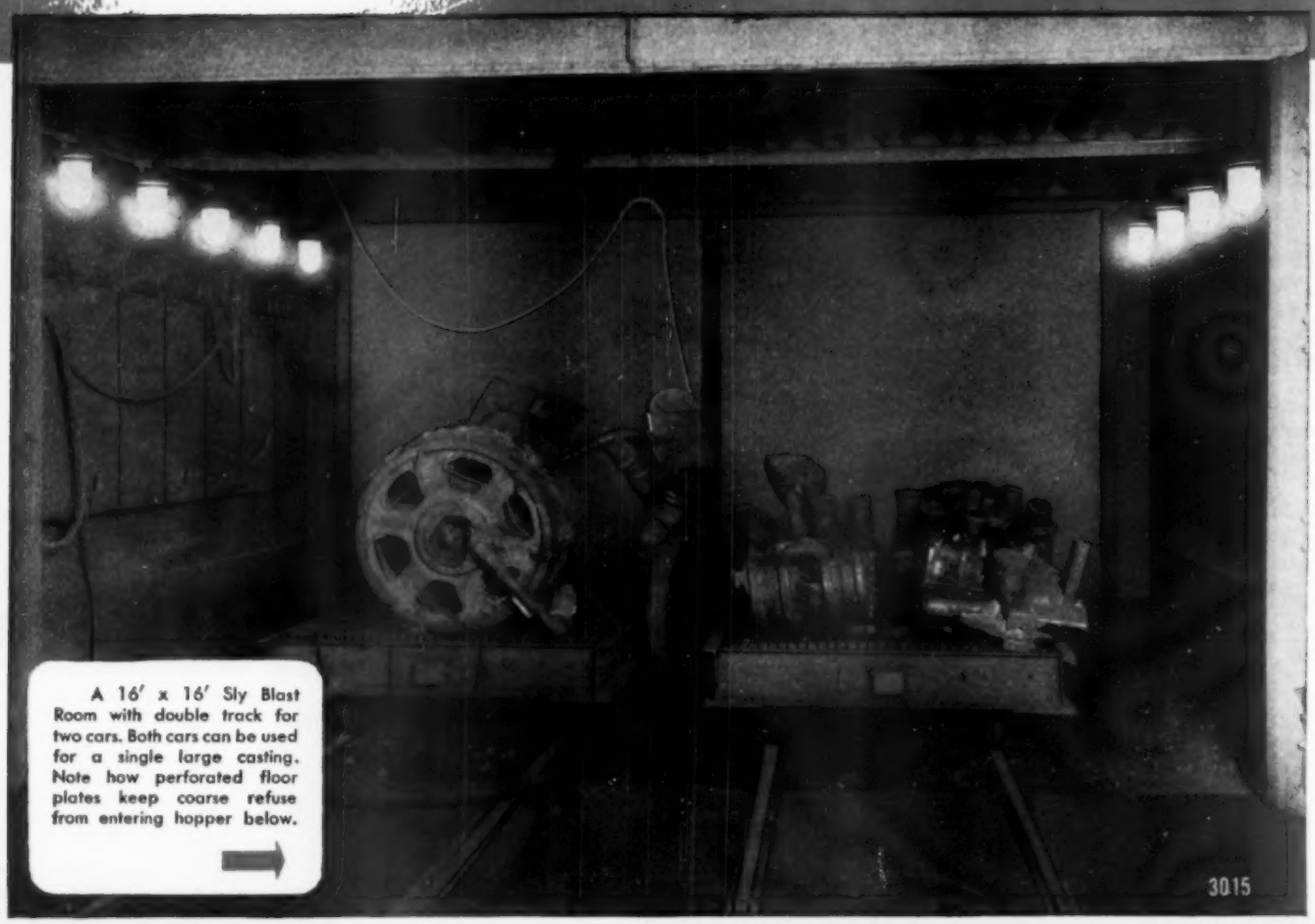
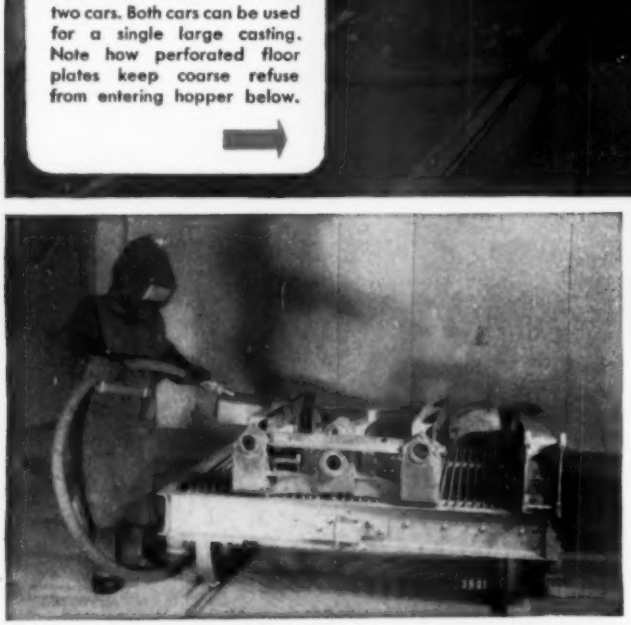


A 16′ x 16′ Sly Blast Room with double track for two cars. Both cars can be used for a single large casting. Note how perforated floor plates keep coarse refuse from entering hopper below.



This view shows a Sly Blast Car in a Sly Blast Room. Perforated floor plates are supported by grating preventing plates from warping. Observe how tops of rails are flush with floor. Operator wears a Sly "Purair" Helmet.

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STEEL FOUNDERS' SOCIETY OF AMERICA

Holds Annual Fall Meeting

By FRANK G. STEINEBACH
Editor
THE FOUNDRY

CONSIDERATION of steel castings in the defense planning program, and reports of numerous committee activities, featured the 48th fall meeting of the Steel Founders' Society of America at Hot Springs, Va., Sept. 25-26. Attendance set a new record for the society.

In opening the meeting, T. H. Shartle, president, Texas Electric Steel Casting Co., Houston, Tex., and president of the society, discussed many of the group's important activities. In reporting on the work of the handbook committee and the publication of the new *Steel Casting Handbook,* he said industry members would be canvassed with an idea of individual companies supplying the student edition of the handbook to engineering students at various educational institutions.

Committees Are Active

Mr. Shartle reported the specifications committee has been active with various government agencies, and work has been under way in developing voluntary minimum standard specifications for carbon steel castings. He stated that the advertising committee has been very active the past year and that a booklet containing samples of the various publicity and advertising materials provides an impressive display. The president stressed the fact that the product development committee has done a splendid job in increasing acceptance of steel castings. In closing, Mr. Shartle indicated the need for continuing the maintenance of high quality of product and a furtherance of product development and other activities at the local level.

A. J. McDonald, American Steel Foundries, Chicago, and chairman of the product development committee, presented the fifth report on activities of that group. Mr. McDonald pointed out that because the industry was challenged by many competing materials, the product development committee was formed in the interest of retaining markets and increasing the use of cast steel parts. While the committee may lay claim to modest measurable successes, these will prove only as a starting point if the steel foundry industry is to take advantage of its opportunities in the future.

The chairman pointed out that in the last report to the society, one-third of the foundries in the organization reported conversion to steel castings in the amount of 4400 tons valued at $1,825,000. Another 3500 tons valued at $1,500,000 has been added since that time, making a total conversion of 7900 tons with a value of $3,325,000. Comments indicate that more attention is given to selling cast steel parts for specific applications rather than on the pound basis. Importance of this attitude was stressed in the committee report.

Work has been going forward toward the voluntary adoption of a set of minimum standards for commercial steel castings. The specifications committee has processed comments and recommendations and the final draft is being considered by the board of directors. If approved, it will be sent to the individual foundries for adoption, if so desired.

Mr. McDonald also reported progress in preparing recommended practices for repair welding of steel castings. The committee has engaged Battelle Memorial Institute to aid in this work and results of the study are being turned over to the specifications committee for further work. The material will be submitted to the membership according to approved society procedure.

THOMAS H. SHARTLE

The chairman also reported on the sales training program, the importance of a product engineering department in foundries, the formation of a subcommittee for the purpose of undertaking a study of design factors and their effect on the load-carrying capacity of cast steel structures, and the importance of continuing to improve the quality of steel castings produced by the industry.

W. J. Phillips, director, product development department of the society, emphasized again the importance of quality in order that the cast part may do the job for which it is intended. He stressed the importance of tools available to the steel casting industry and said that many of these tools are not available to producers of products made by other forms of fabrication. Mr. Phillips indicated that investigation is under way dealing with the effect of design factors on costs, not only of steel castings but parts produced by competing methods of fabrication.

Chauncey Belknap, counsel for the society, presented an exceptionally fine analysis of the defense production act of 1950, the directives establishing the National Production Authority, and the orders which have thus far been issued by that organization.

Need More Publicity

Warden F. Wilson, sales manager, Lebanon Steel Foundry, Lebanon, Pa., and chairman of the advertising and public relations committee of the society, summarized the work of that group in publication advertising, direct mail and publication releases. He stated that a survey by one member of the society has indicated the need for a promotional type motion picture dealing with the production and use of steel castings. He then showed the moving picture, "This Moving World," produced by the Malleable Founders' Society.

Col. Earl D. Payne, industrial liaison officer, Munitions Board, Washington, presented an interesting paper, "The Relationship of the Steel Casting Industry to the Munitions Board." His paper is reproduced in this issue starting on page 101.

F. Kermit Donaldson, executive vice president of the society, discussed in considerable detail the various organizations which make up the defense planning program. He referred to the work of the steel foundry industry with the Munitions Board of the Department of Defense and the contacts with the National Security Resources Board, with the newly formed National Production Authority, and with other governmental departments concerned with the defense program.

Comdr. R. Doughton Jr., Office of

Naval Material, spoke at the luncheon on "The Military Looks to Industry." Commander Doughton paid tribute to the work of the steel casting industry during World War II, discussed the increase in capacity which has taken place since 1941, and said that an orderly and reasonable administration of voluntary allocations will do much to obviate the necessity for arbitrary monitoring of production by government. Commander Doughton emphasized the complexity of the military planning job and indicated that this is directly reflected in the complexity of industrial planning, especially in a system of free enterprise. In this connection he stressed the need of detailed industrial mobilization plans, plantwide, companywide and industrywide.

At the last session President Shartle presented honor safety awards for the contest held by the society during June, July and August. For the purpose of the contest, foundries of the industry were divided into four approximately equal groups on the basis of the number of man-hours of exposure per month. Highest honor safety awards were provided for the foundry with the best record in each group and certificates of safety achievement were provided for those foundries whose cumulative frequency was 10.0 or less.

The honor safety awards were made as follows:

Group No. 1—1 to 14,000 man-hours: Malcolm Foundry Co., Newark, N. J.; Quincy Steel Casting Co., North Quincy, Mass.; Weatherly Steel Castings Co., Weatherly, Pa.; Eastern Malleable Iron Co., Wilmington, Del.; Tonawanda Electric Steel Casting Corp., North Tonawanda, N. Y.; Hughes Tool Co., Houston, Tex.; Lectromelt Casting Co., Barberton, O.; Allegheny Ludlum Steel Corp., Forging & Casting Division, Ferndale, Mich.; National Supply Co., Torrance, Calif.; Skagit Steel & Iron Works, Sedro-Woolley, Wash.

Group No. 2—15,000 to 29,000 man-hours: Deemer Steel Casting Co., New Castle, Del.; Hartford Electric Steel Corp., Hartford, Conn.; Walworth Co., Greensburg, Pa.; Alloy Steel & Metals Co., Los Angeles; Hanford Foundry Co., San Bernardino, Calif.

Group No. 3—30,000 to 69,000 man-hours: Adirondack Foundries & Steel Inc., Watervliet N. Y.; Bethlehem Steel Co., Steelton, Pa.; American Steel Foundries, Newark, N. J.; Standard Steel Works Division, Baldwin Locomotive Works, Burnham, Pa.; Ross-Meehan Foundries, Chattanooga, Tenn.; Texas Electric Steel Casting Co., Houston, Tex.; Mackintosh-Hemphill Co., Midland, Pa.; Union Spring & Mfg. Co., New Kensington, Pa.; Sawbrook Steel Castings Co., Lockland, O.; Burnside Steel Foundry Co., Chicago; Superior Steel & Malleable Castings Co., Benton Harbor, Mich.; Kay-Brunner Steel Products Inc., Alhambra Calif.

Group No. 4—70,000 man-hours and up: Bethlehem Steel Co., Bethlehem, Pa.; General Steel Castings Corp., Eddystone, Pa.; Continental Foundry & Machine Co., Coraopolis Pa.; Carnegie-Illinois Steel Corp., Johnstown Pa.; Duriron Co. Inc., Dayton, O.

Certificates of achievement were awarded to:

Group No. 3—30,000 to 69,000 man-hours: Allegheny Ludlum Steel Corp., Brackenridge, Pa.; Crucible Steel Casting Co., Cleveland; Massillon Steel Casting Co., Massillon, O.

Group No. 4—70,000 man-hours and up: Chapman Valve Mfg. Co., Indian Orchard, Mass.; Worthington Pump & Machinery Corp., Harrison, N. J.; Symington-Gould Corp., Depew, N. Y.; Pratt & Letchworth Co., Buffalo; United Engineering & Foundry Co., Vandergrift, Pa.; American Steel Foundries, Alliance, O.; Dayton Steel Foundry Co.; Dayton, O.; Falk Corp., Milwaukee; Continental Foundry & Machine Co., East Chicago, Ind.; American Steel Foundries, East St. Louis, Ill.; American Steel Foundries, Granite City, Ill.; and General Steel Castings Corp., Granite City, Ill.

MALLEABLE FOUNDERS MEET AT CLEVELAND

To Discuss Society and Industry Problems

INDUSTRY meeting of the Malleable Founders' Society was held at Hotel Cleveland, Cleveland, Sept. 22. Society president Ralph T. Rycroft, president, Kencroft Malleable Co., Buffalo, presided at the meeting, which was devoted to discussion of various subjects affecting both the industry and the society.

The organization's market development committee is planning a second conference patterned after the successful initial conference held last fall in Evanston, Ill., it was announced by William J. MacNeill, Dayton Malleable Iron Co., Dayton, O., the committee chairman. The conference probably will be held some time after Dec. 1.

Functions of the Munitions Board and how it operates were explained by Col. Earl D. Payne, industrial liaison officer of the board. A detailed discussion of this subject by Colonel Payne is presented on page 101 of this issue. The industrial mobilization plan for the malleable iron castings industry also was discussed by Colonel Payne and Collins L. Carter, president, Albion Malleable Iron Co., Albion, Mich., and chairman of the malleable subcommittee of the Foundry Industry Advisory Committee to the Munitions Board. Details of the subcommittee's mobilization plan start on page 100 of this issue.

Developments at Washington affecting the malleable foundry industry were touched upon by Lowell D. Ryan, managing director and secretary of the society. He explained the few orders issued to date by the National Production Authority, including those affecting inventory control and the keeping of records on prices as of June 24. He said it appeared most military contracts will be subject to renegotiation. Little of an official nature has appeared with respect to draft deferments, action being mostly up to local boards. It was recommended that deferments for key workers be sought before the individuals are classified.

High lights of the conference on nodular iron sponsored by Massachusetts Institute of Technology, Sept. 12-13, were described by James H. Lansing, technical and research director of the society. A report on this conference is presented elsewhere in this issue.

Obsolete depreciation methods are causing industry to overstate its profits by $1.7 billion, it was declared in a talk by John S. Morgan, associate editor, *Steel*. Current procedure, he said, is based on surveys of the late 1920's and early 1930's, and inflation is not taken into consideration. This is a psychological block on re-equipping plants. If Congress is to revise depreciation methods it will be necessary for industry to present definite proof of the present program's inadequacy.

Trends in labor contracts were discussed briefly by Frank Heath, Cleveland attorney. He explained that the recent settlements by the major automobile companies prior to expiration of existing contracts seem to be setting the pattern for other industries.

The meeting was concluded with the showing of a new motion picture on the subject of safety produced for General Motors Corp.

Book Review

Theoretical Chemical Reactions in Basic Arc Electric Furnace, paper, 15 pages, 6 x 9 in., by H. C. Bigge, Superintendent, Tool Steel Department, Bethlehem Steel Co., Bethlehem, Pa. Published by the author. Price $3.

Material in this booklet has proved so interesting it was felt that it should be more widely circulated and its information made available to those concerned with the subject.

Oxidizing and reducing conditions in the basic arc furnace are discussed. Reactions that occur during the oxidizing period are listed and reducing agents used for various steels and alloys and their chemical reactions are grouped according to reducing agent employed. Other subjects covered include sulphur elimination during the reducing period, desulphurization, and a reduction table for some of the important oxides encountered in the iron and steel industry. Report of International Commission on Atomic Weights for 1947 concludes the booklet.

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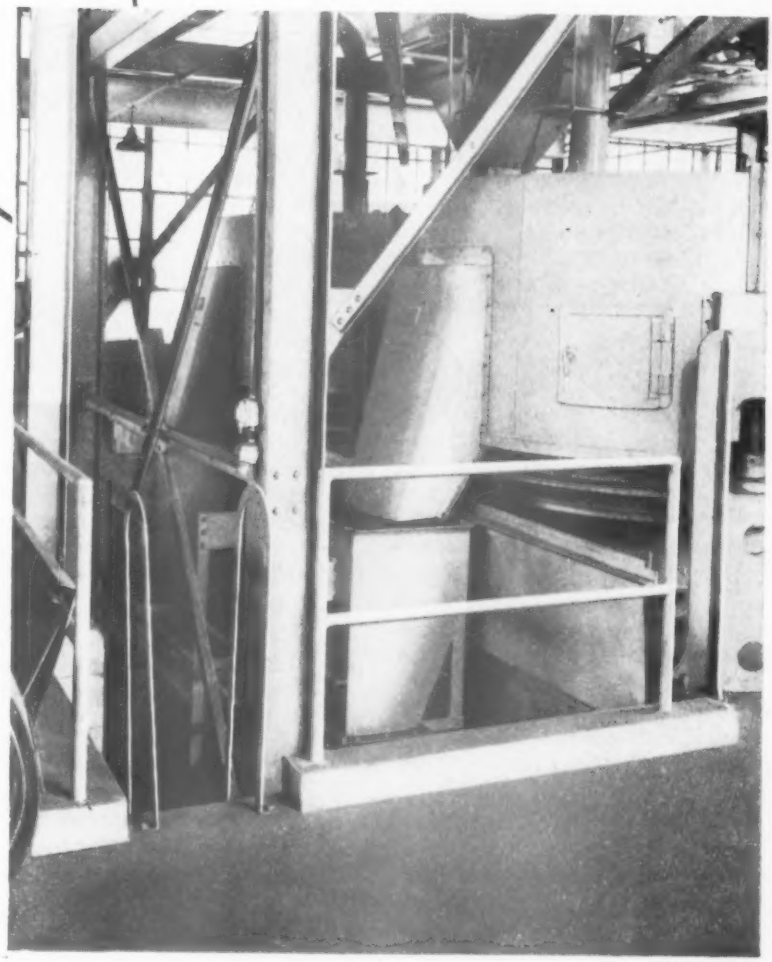

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Around THE COUNTRY

PITTSBURGH—Scarcity of raw materials continues chief obstacle to augmenting production schedules among captive and jobbing casting shops, and no improvement in this situation is expected through remainder of this year. Other problems facing foundrymen are growing manpower shortage and narrowing profit margins resulting from continued upward trend in freight rates and prices for coke, pig iron, scrap and refractories.

Through greater utilization of scrap, foundries generally have been able to maintain five-day-per-week operations. However, output is well below demand and the spread between demand and supply is expected to widen considerably over coming months. Since this situation cannot be readily remedied by increasing production, due to shortage of basic raw materials, merchant iron suppliers undoubtedly soon will have to extend preferential treatment to those foundries supplying castings for direct and indirect war requirements. Such a policy was adopted on restricted basis early in September. Foundries serving the railroad industry, for example, have increased production nearly 100 per cent since early this year. Some of these interests curtailed output late last year to point where their iron commitments represented a very small factor in distribution pattern of merchant iron suppliers. These same suppliers now can only satisfy railroad casting requirements at expense of customers in less essential classifications.

A few foundries have supplemented iron supplies through purchase of foreign pig iron. However, price of such iron has advanced substantially in recent weeks to around $55 f.a.s. eastern seaboard, and foreign sources can no longer offer relatively prompt deliveries.

Shortage of pig iron is not restricted to foundry grades, commitments for foreign iron also having been made by midwestern steel interests to offset disappointing blast furnace yields. Of considerable importance to prospective users of imported pig iron is proposed rail rate reduction by the carriers from $8.75 per gross ton to $7.50 from Baltimore to Pittsburgh district. However, shippers are seeking a still lower rail rate of about $6.50. Shipments of import iron ore from eastern seaboard ports all rail to mills in midwest have, since Oct. 9, been moving on basis of $2.51 per gross ton to Pittsburgh district and $2.71 to Youngstown. Previous rate was $2.79 per gross ton.

* * *

NEW YORK—Due primarily to expanding demand, district gray iron foundries have backlogs averaging around two months. Foundries are operating an average of more than five days a week; few, if any, are working less than five days and some are on six-day schedules. Steel foundry production is perhaps a little higher than gray iron output, while nonferrous casting production is possibly a shade lighter.

To date there has been little direct defense work, most of expanding demand being due to efforts of commercial casting buyers to step up production. Increased call for machine tool and railroad castings has been notable.

So far pig iron, coke and scrap supplies have been adequate. However, foundrymen have not been able to build up inventories to the desired extent and are having to pay higher prices for scrap and pig iron. Nonferrous metal supply is tighter, especially nickel and aluminum. So far foundries have been able to fill requirements, but increased cost of their supplies is resulting in higher casting prices. Skilled foundry labor is tight.

* * *

PHILADELPHIA—Casting demand continues to expand. Steel foundries are particularly busy, a number now operating three shifts but still limiting the weekly schedule to five days a week. Gray iron foundries are at 100 per cent of normal capacity and working at least five days a week. Some are operating every other Saturday as well. Delivery promises on gray iron average around 10 to 12 weeks. Nonferrous foundries are close to normal capacity. Operators complain about the shortage of secondary aluminum and particularly about the increases in prices for this material. Copper and zinc also are in tight supply although prices are relatively stable, nonferrous foundry operators say.

While demand reflects the growing needs of rearmament work, these requirements to date—especially as they apply to direct military specifications—have not involved heavy tonnage. Much of present activity is ascribed to pressure to get out as much civilian work as possible before government restrictions become too pronounced. Some of the pressure for castings is due to a shifting in certain instances from fabricated steel work to castings, because of the growing stringency in rolled steel products, particularly plates.

Labor is scarcer and in certain nearby communities where wage advances have lagged, some foundries—especially smelt shops—have increased rates five to ten cents an hour to bring schedules up to the average rate of the district and thus retain workers. Some of these increases, if not most of them, were made voluntarily.

Increasing scarcity of domestic pig iron has stimulated buying of foreign iron. It is estimated that about 25 per cent of the foundries in this area have bought some foreign iron in recent weeks. Larger foundries, including pipe producers, have been particularly active in buying imported iron. Some of the more recent purchases have been at around $52 f.a.s., but the foreign market now is tending upward to around $53-$54.

Suspension of operations at the larger of the two Swedeland, Pa., blast furnaces has added much to the stringency in the local area. This furnace went down in mid-September and was scheduled to be back in blast late in October. While the Swedeland stack shutdown has eased the situation in foundry coke, most foundries are concerned over future prospects in coke as well as in pig iron, especially in the light of expanding government emergency regulations. Cast scrap prices have advanced sharply because of the pig iron scarcity.

* * *

LOS ANGELES—Foundry activity is surging for the 77 ferrous and 180 nonferrous foundries in this district.

(*Continued on page* 146)

FERRO MANGANESE FROM TENNESSEE

You can save freight costs by ordering mixed cars of Ferro Manganese, Ferro Silicon and briquettes. Specify standard grade lump, regular sized or briquettes in bulk or containers.

Test Tennessee's dependability—place an order for your next requirement of Ferro Manganese.

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TENNESSEE PRODUCTS & CHEMICAL Corporation
NASHVILLE, TENNESSEE

(*Continued from page* 144)

Before Korea, business was so quiet many foundrymen thought they were back in 1930. Now, foundries are working five days a week—with overtime. Some are adding night shifts and working Saturday. Work backlogs are up. Prior to Korea foundries had little trouble keeping current with orders, now most have 60-day backlogs. Sales volume has expanded 30 per cent in the past 60 days.

Melting rates are heavier. One steel foundry since June upped its daily melt by 35 per cent, a 70 per cent increase in tonnage over January. September melts were 15 per cent heavier than in August.

Supplies of scrap and pig iron are currently adequate here, but expansion plans are hampered by shortage of skilled personnel. Molders and coremakers are especially hard to find.

"Behold A Smoking Furnace," sound film on smoke and fume control made by Southern California Chapter of the Non-Ferrous Foundryman's Society, is going on nationwide tour. For the past year the film has been made available to 60 groups in southern California without charge. First stop of the film is scheduled for Seattle. It will then travel eastward. Those interested in seeing the film may write Bob Haley, Advance Aluminum & Brass Co., 1001 East Slauson Ave., Los Angeles, Calif.

* * *

CHICAGO—Announcement by the Air Force that Ford Motor Co. will take over the former World War II Dodge-Chicago plant here and reactivate it to manufacture 28-cylinder, 3500-hp Pratt & Whitney Wasp Major engines will again give Chicago a boost in its dominance as a producer of castings. Chrysler Corp. built the plant for the government at a total cost of $180 million and put it into operation in 1943-44 to build 18-cylinder, 2200-hp Wright air-cooled engines for Army B-29's. The largest industrial plant in the world, it included twin highly mechanized aluminum and magnesium foundries, each the largest of its type in the country. (See THE FOUNDRY, August 1944, p. 78, and September 1944, p. 80). Identical in size and exterior appearance, each was 750 feet long and 480 feet wide.

For an extended period prior to end of the war, these foundries melted daily approximately 125,000 pounds of aluminum and 50,000 pounds of magnesium, respectively. The aluminum foundry concentrated production on one casting, the finned cylinder head weighing 40 pounds; the magnesium unit made eight different castings ranging in size from a sump weighing 14 pounds to the large nose piece which weighed 84 pounds.

The two foundries have been held in standby condition, not being included in the lease of the main plant to the Tucker Corp. for building its projected rear-engined automobile. Production by Ford is scheduled to start in 6 to 12 months.

TWO-WAY squeeze is being exerted on foundrymen here in their attempt to boost castings output to meet the unprecedentedly high demand. Materials and labor shortages are the bugaboos. Manpower tightness is not as serious nor on as broad a scale as the lack of coke, pig iron and scrap, but is an increasingly relevant factor. The draft and call-up of reserves are little more than an annoyance at this point, but replacement of these men is difficult. Siphoning off of some foundry workers to other industries is also taking place. Wage rates, as a result, are under pressure. Foundries are being advised to hire women wherever possible.

Pig iron continues the most critical raw material. Only three blast furnaces of the district's 42 are out of operation, one being idle for lack of coke and the other two undergoing repairs, but output for merchant use appears far below current foundry requirements. Higher iron prices were anticipated and brought little adverse customer reaction. Coke price also is up, and some interests expect a deterioration in quality as coking time is reduced to increase oven output.

Cast and other foundry grades of scrap are at a premium, the market verging on a run-away despite determined effort of the trade to stem the tide. Foundries and converters have outbid steel mills and to great extent thwarted stabilization efforts on grades in which all are interested. Pressure for foundry raw materials was not relieved noticeably by widespread strikes in captive farm equipment shops, contrary to expectations. This industry is not likely to have normal seasonal demand fluctuations for some time to come.

INTEREST in air pollution arising from foundry smoke, fumes and dust is growing among Chicago foundry operators. Co-operating with the Department of Smoke Abatement and Inspection of the City of Chicago and the Cleaner Air Committee of the Chicago Association of Commerce and

(*Concluded on page* 150)

PRESENTATION of 50-year service awards were made to five employees of Farrel-Birmingham Co., Ansonia, Conn., at the company's recent annual Old Timers' Club party. Left to right, are: Henry T. King, Roderick R. Hazard, Christopher C. Harris, Joseph B. Wolfe, and Carl F. Schnuck, who is receiving his diamond-studded pin from Franklin Farrel Jr., former chairman of Farrel-Birmingham board of directors. These five men join a group of ten other active and five retired employees with service records of 50 to 58 years. The Old Timers' Club has 330 members with 25 or more years' service

Money-Saving monolithic linings for acid electric furnaces and ladles give cleaner steel

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MONOLITHIC REFRACTORY LINING

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. . . is a proved-in-practice material. You take no chances when you use it to line your acid electric furnaces, side-blown converters, and ladles handling malleable iron, alloy iron, or electric steel.

CARO-LINE is a highly siliceous refractory blended with ceramic minerals to give a tough, thorough bond. That means exceptionally high refractoriness, volume stability at high temperatures, and no tendency to slag off. Your ladles work cleaner. Your steels are almost completely free of slag inclusions.

CARO-LINE is fine-grained . . . works smoothly as a ramming material. The cost records of leading foundries prove it far superior to clay-ganister mixtures. CARO-LINE cuts labor costs, gives longer service. Monolithic linings have no weak joints for slag attack, so you seldom lose castings due to slag inclusions.

Ironton representatives can tell you more. Get in touch with the nearest office listed at the right.

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Jacksonville, Florida	3-5586
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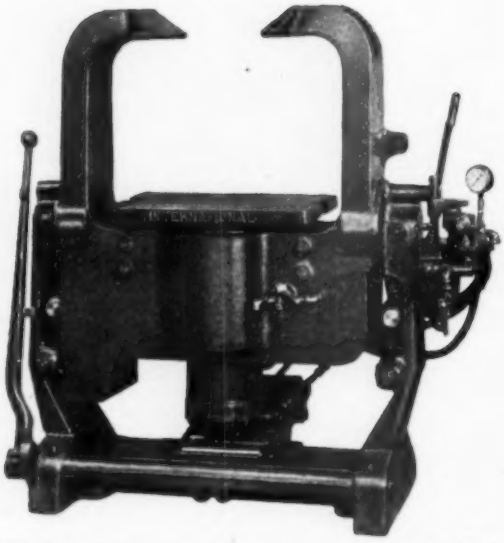
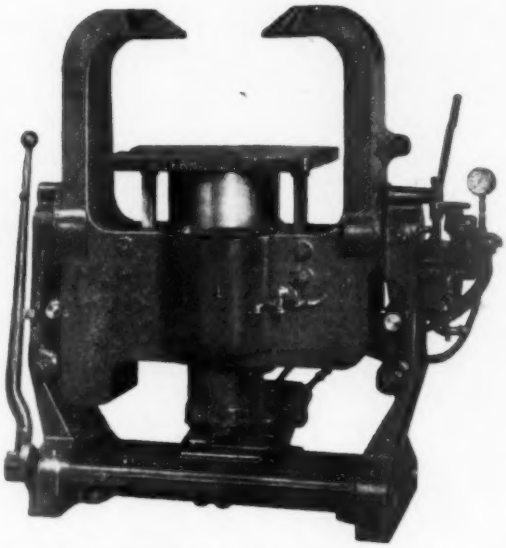
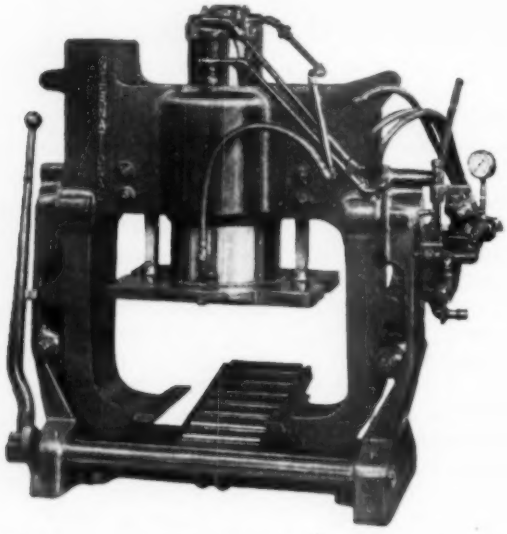
OPERATING CYCLE OF THE RES MACHINE



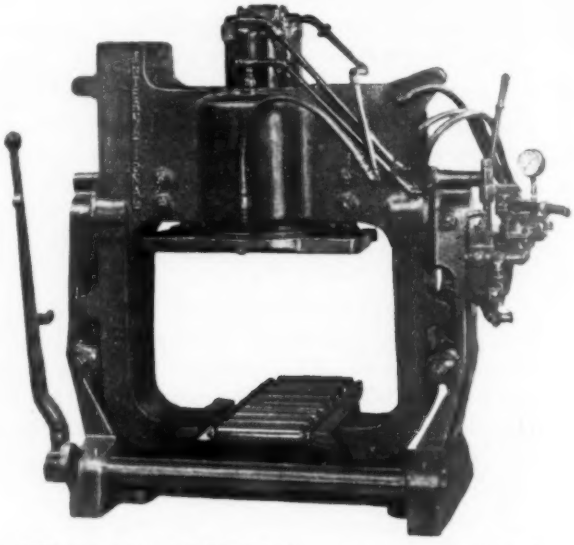
1 JOLTING POSITION . . . ready for flask, sand and jolting. Strike-off and place bottom board on sand.



2 SQUEEZE POSITION . . . actuation of squeeze valve raises squeeze piston, thereby squeezing the mold and clamping the bottom board and flask into one integral unit, ready for rollover.

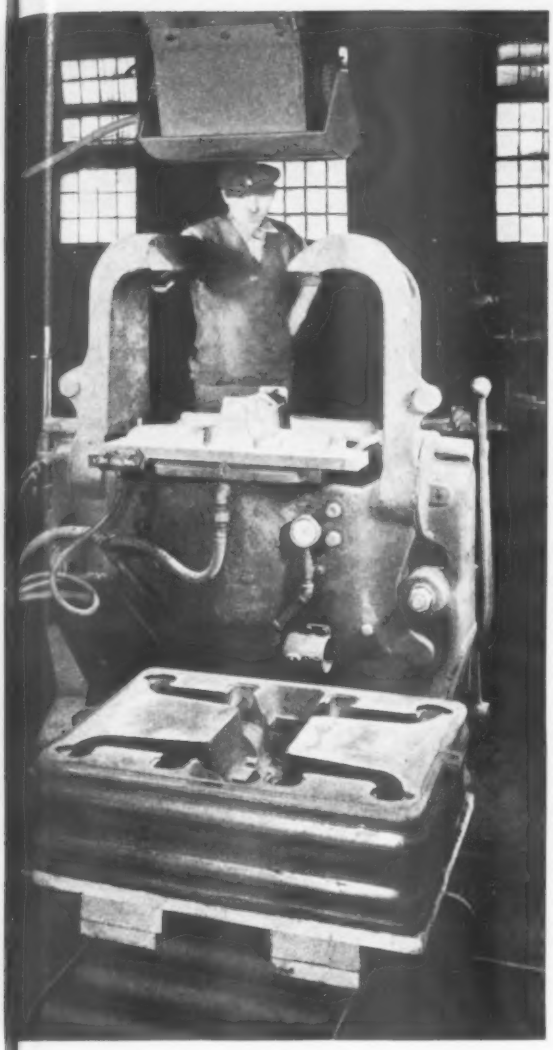


3 ROLLOVER POSITION . . . a slight pull of rollover frame by hand, rolls the machine over ready to operate the draw.



4 DRAW POSITION . . . by actuation of the vibrator valve and draw valve, the pattern is drawn from the mold. Rollers are then raised and mold pushed out by foot.

INTERNATIONAL



Features of the Type RES Machine

The fastest type Jolt, Squeeze, Rollover, Draw Machine.

Draw is always true because of integral frame and draw feature.

Completely above floor line . . . no pit necessary.

Engineered for ease of maintenance.

The **Type RES** is designed, as are all machines in the INTERNATIONAL LINE, by experienced foundry engineers who have a practical working knowledge of the problems of the business.

Inquiries should specify maximum outside width and length of the largest flask to be used, including trunnions and handles, allowance required for depth of flask, pattern plate and bottom board and amount of draw required.

MOLDING MACHINE COMPANY

LA GRANGE PARK, ILLINOIS

(*Concluded from page* 146)

Industry, the foundry industry more than a year ago organized a Foundry Executives Subcommittee of the Cleaner Air Committee and, taking its responsibilty seriously, has already achieved notable progress. A tremendous amount of work remains to be done before anything approaching full success can be recorded.

The Foundry Executives Subcommittee is headed by James R. Allan, manager, Industrial Engineering and Construction Department, International Harvester Co., and under his guidance subcommittees representing the gray iron, malleable, steel and nonferrous divisions of the industry are at work. These groups stand ready to assist. The National Foundry Association, Chicago, reports so many inquiries for a paper, "Dust, Fume and Smoke Suppression," which Aubrey J. Grindle, vice president and consulting engineer, Whiting Corp., Harvey, Ill., presented before the Association of Iron and Steel Engineers' convention in Cleveland in September that it has obtained copies for distribution. Any foundry in this area faced with a violation of the smoke ordinance or an air pollution problem has ample sources to turn to for assistance.

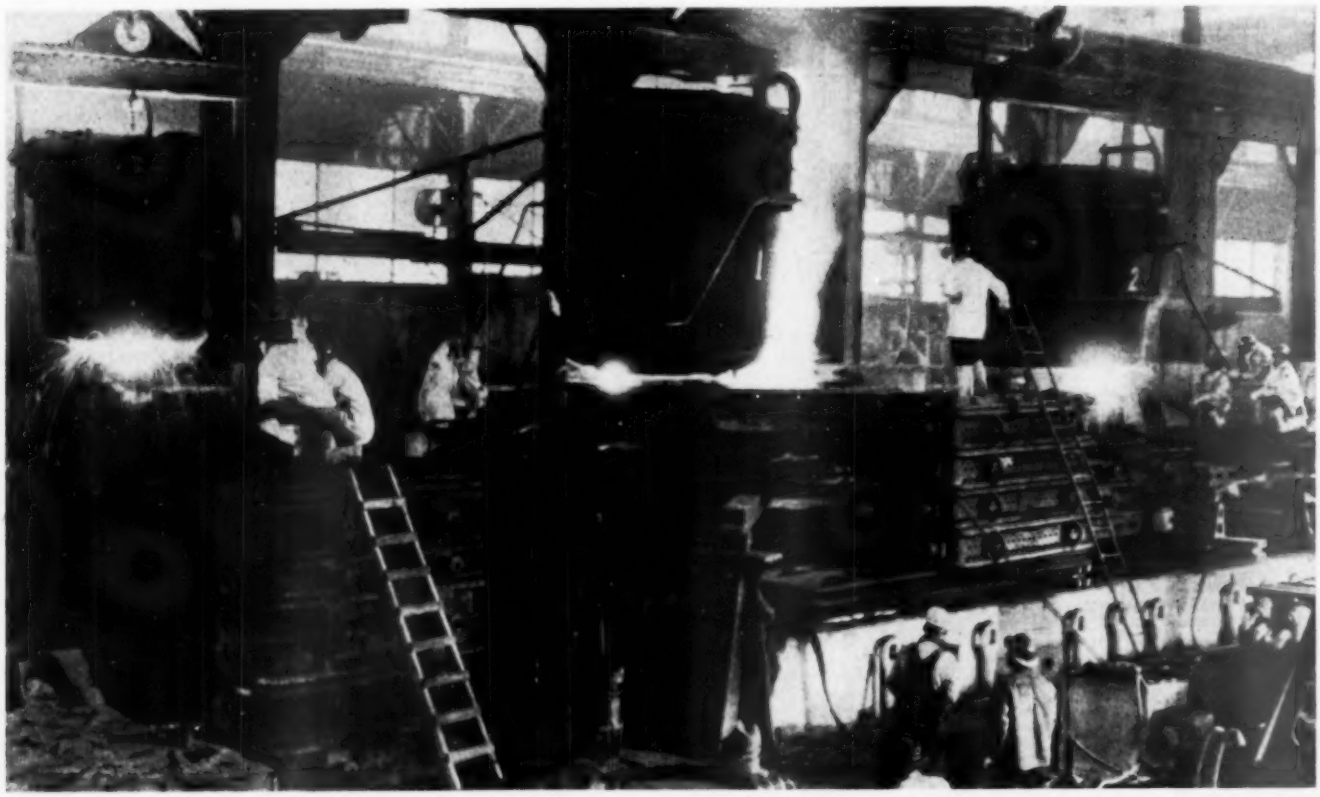
CITY Manager of Park Ridge, Ill., a Chicago suburb, has recommended a change in the city's building code to require cast iron sewers for all new construction. The change, which would make mandatory installation of iron pipe from 5 feet outside the building to the basement and throughout the building, would allow installaton of backwater gate valves to shut off sewers and prevent backup during heavy rains. Such a valve can not be used on vitreous pipe because of the danger of bursting under pressure. It is estimated that average additional cost to a homeowner would be about $50 to $75. Cast iron sewers are used widely in the United States but are not specified in Cook County. Much flooding has occurred in the Chicago area in recent years, and should installation of cast iron pipe be adopted throughout the country makers of soil pipe would derive a nice volume of business.

Casts 150-ton Steel Anvil Block in a Single Mold

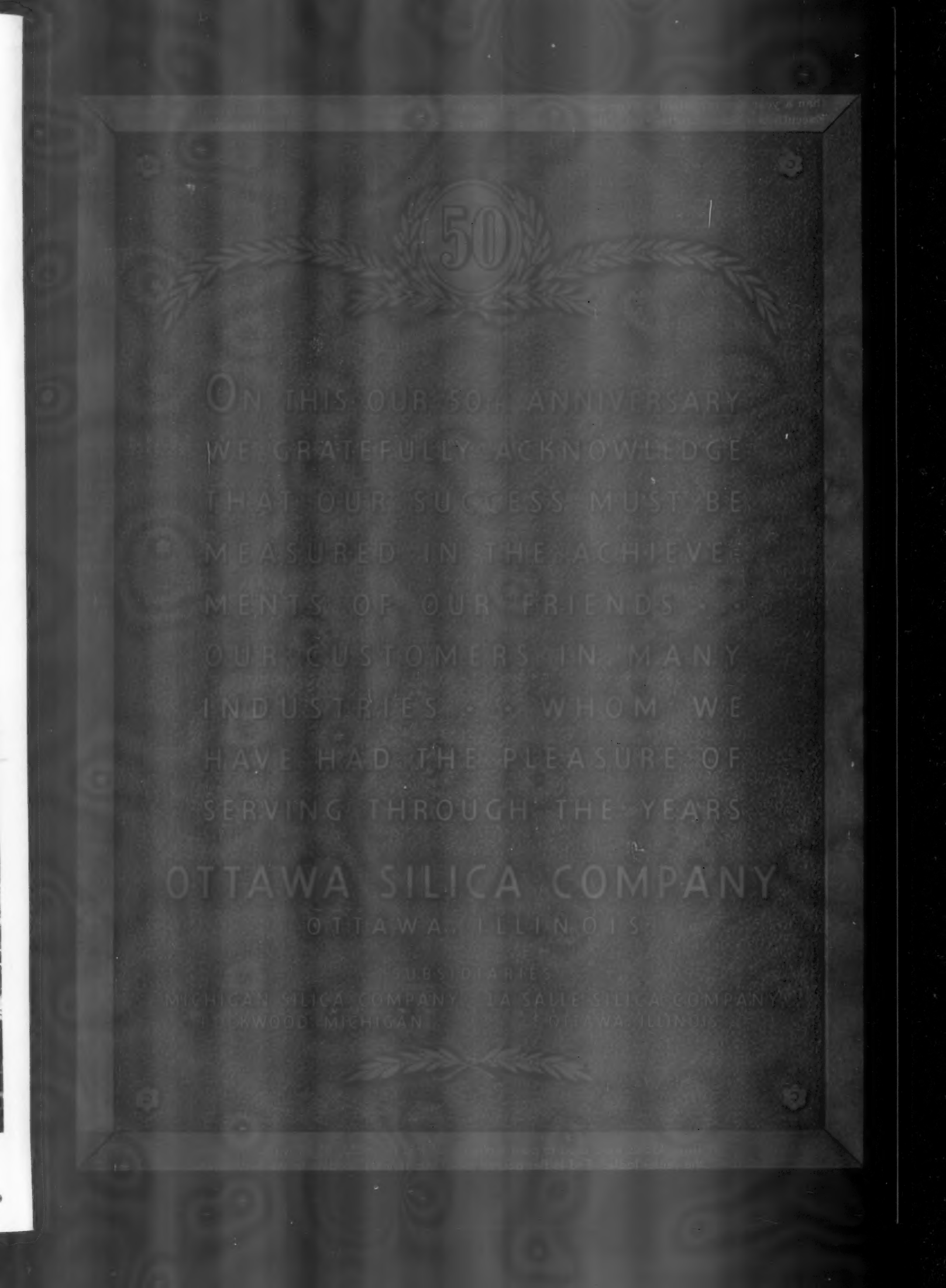
CONTINENTAL Foundry & Machine Co., Chicago Works, recently cast a 300,000-lb anvil block for a large power hammer in a single mold. Three open-hearth furnaces in two adjoining foundries were required to melt the 150 tons of steel; the molten metal was tapped into three ladles for pouring the mold.

Although actual pouring required only 14½ minutes, over six weeks were spent in preparation and in making the mold. Top of the completed sand mold extended 20 ft above the bottom of the molding pit and included an elaborate arrangement of ten in-gates through which the metal flowed from the three ladles. Before pouring, the mold was dried with hot air for 48 hr.

After the initial pour at 2900°F was completed, an additional 25,000 lb of metal was poured into a riser which was kept molten for several days with an electric heating element. When the casting was poured, it was left in the sand for approximately sixty days to solidify and cool. The entire job, from receipt of order to completion of machining, took approximately four months.



Three ladles were used to pour molten steel into the mold, which is directly under the center ladle. End ladles poured metal into runners, leading to the mold cavity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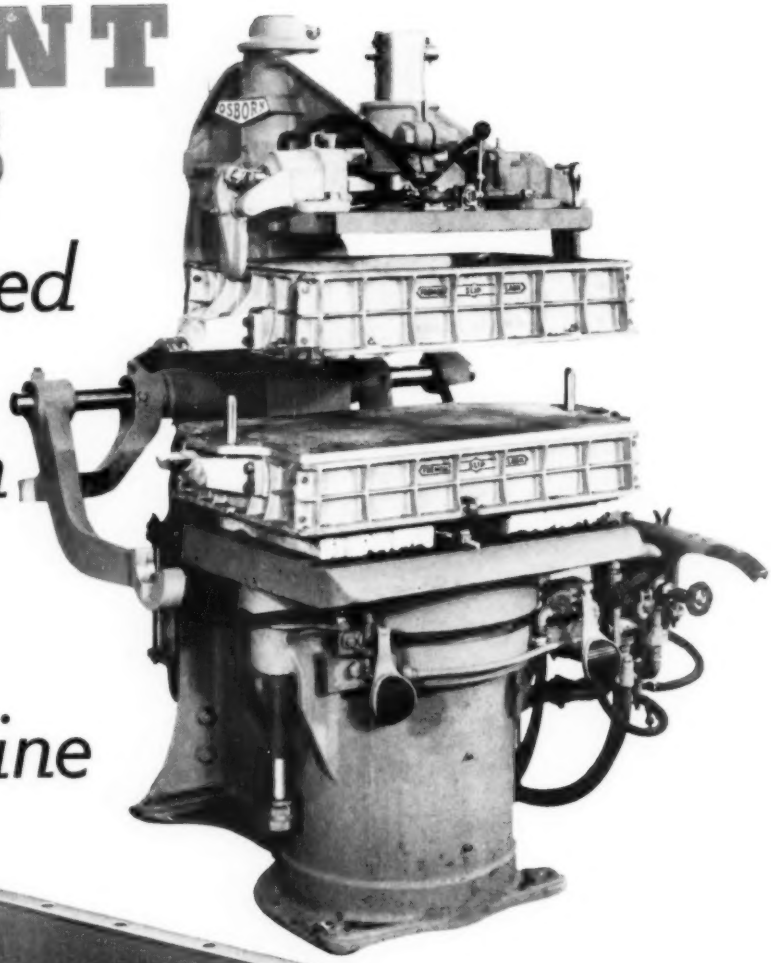
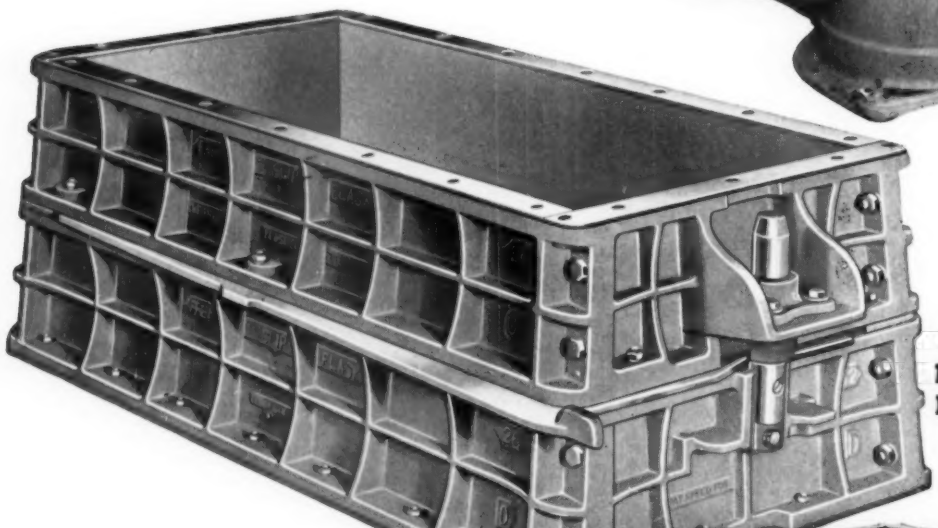
FREMONT FLASKS

are ideally suited to help speed production with the Osborn Rota-Lift Molding Machine





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ALL ORDERS GIVEN PROMPT ATTENTION

GROOVLOCK
THE FOOL-PROOF PIN

THE FREMONT FLASK CO.
Fremont, Ohio

Industry BRIEFS

WERNER G. SMITH INC., 228 Union Commerce Building, Cleveland, has purchased a plant from the Barrett Division of Allied Chemical & Dye Corp., at 1730 Train Ave., Cleveland, thus providing manufacturing facilities for the production of its line of core oils. The plant has a storage capacity for 4,000,000 gallons of vegetable oil, and is served by three private railroad sidings. Other facilities include mixing tanks, quality control laboratory and a warehouse.

* * *

Columbus McKinnon Chain Corp., Tonawanda, N. Y., has purchased the plant, equipment and inventory of the Dixon Chain Mfg. Co., Dixon, Ill. The company, an affiliate of Chisholm-Moore Hoist Corp., Tonawanda, N. Y., will now have plants at Dixon, Ill., Tonawanda, North Tonawanda and Angola, N. Y., as well as subsidiary companies in St. Catharines, Ont., and Johannesburg, South Africa.

* * *

American Die Casting Co., 646 Ottawa St., Grand Rapids, Mich., plans construction of an $18,000 one-story cinder block plant, with 7500 sq ft of production space, as part of a $30,000 expansion program which will double total production area and employment.

* * *

Alabama By-Products Corp., Tarrant, Ala., plans addition of 29 new coke ovens capable of producing 150,000 tons of coke annually. The installation, to be made by Koppers Co., Pittsburgh, will bring to 203 the number of ovens operated by the Alabama company.

* * *

Brumley-Donaldson Co., 3050 East Slauson Ave., Huntington Park, Calif., has moved its San Francisco Bay area offices to 75 Market St., Oakland, Calif.

* * *

Kindt-Collins Co., 12651 Elmwood Ave., Cleveland 11, is constructing a 7000 sq ft addition to house a small aluminum foundry and a machine shop for manufacturing disk and spindle sanders.

* * *

Foxboro Co., Foxboro, Mass., manufacturer of industrial instruments for measurement and control, has added a branch office at 214 West Tenth St., Wilmington 1, Del., under the managership of Kenneth L. Barton. Another office has been opened at 225 South Fifth St., Minneapolis 2, with Robert C. Cahill as resident engineer.

* * *

Dixie Pipe & Foundry Co., Pell City, Ala., recently was formed to manufacture soil pipe, fittings, gas and water meter boxes and manhole covers. The plant is expected to be completed by Jan. 1 and will employ between 200 and 225 men when in operation.

* * *

Binks Mfg. Co., Chicago, manufacturer of spray guns and industrial finishing equipment, has moved its Milwaukee office from 1123 North Jackson St., to new and larger quarters at 2041 West State St. H. J. Dueno is manager.

* * *

Buckeye Tools Corp., 29 West Apple St., Dayton 1, O., has contracted with Joy Mfg. Co., Pittsburgh, and Joy's Canadian branch at Ontario, for sales and service on Buckeye portable air tools in export markets.

* * *

Keeler Brass Co., 955 Godfrey Ave., Grand Rapids, Mich., is constructing a new plant in Cedar Springs, Mich., which will centralize operations now being conducted there in two separate buildings. A 60 x 150 ft cement block building will be erected. Frederick S. Larned is secretary-treasurer of the company.

* * *

W. W. Sly Mfg. Co., 4700 Train Ave., Cleveland 2, has appointed Horrell Co., 8006 Melrose Ave., Los Angeles 46, as sales engineers for the Sly line of industrial dust control and sandblast equipment.

* * *

Cleco Division, Reed Roller Bit Co., Houston, Tex., manufacturer of pneumatic tools, has appointed Ensminger Co., 57 Wood St., Wilkes-Barre, Pa., distributors of Cleco tools, parts and accessories.

* * *

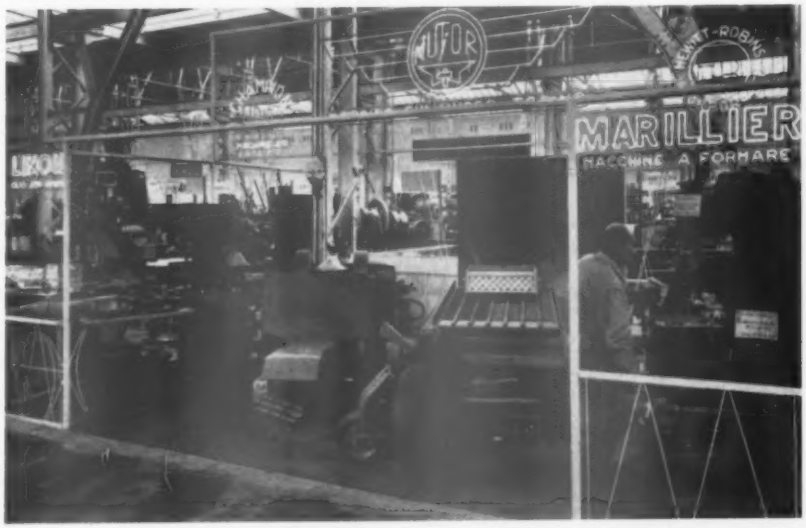
Mid-West Abrasive Co., Owosso, Mich., has completed construction of a new manufacturing plant at Owosso. Further expansion plans call for another factory branch at High Point, N. C.

* * *

The Kernersville, N. C., plant of Borden Co.'s Chemical Division has been expanded to include production of plastic core binders and related foundry items.

* * *

Kankakee Foundry Co., 2081 West Station St., Kankakee, Ill., suffered fire damage Sept. 7.



ITALIAN FAIR: The 28th Fair in Milan, held Apr. 12-30, featured a number of pieces of foundry equipment manufactured in the United States

By EDWIN BREMER

Foundry DEVELOPMENTS

MEASURES to protect plants against sabotage or production slow-downs are recommended in a new guide just issued to industry by the Munitions Board. Titled "Principles of Plant Protection," it supersedes a similar booklet issued in 1943 by the Army and Navy. Requirements listed include security of information, protective construction, and setting up of disaster-control measures. Copies of the booklet are available from Superintendent of Documents, Government Printing Office, Washington 25, for 15 cents each.

* * *

NEW CIRCULAR just released by National Bureau of Standards, Washington, presents practical and basic theoretical principles involved in heat treatment of ferrous metals. Prepared in simplified form principally to give an understanding of heat treatment to those unacquainted with the subject, the circular discusses the effects of various treatments on the structural and mechanical properties of iron and steel, although many theoretical aspects and technical details have been omitted. Subjects presented include properties of iron, alloys of iron and carbon, decomposition of austenite, heat treatment of steels, hardenability, heat treatment of cast iron, nomenclature of steels, recommended heat treatments, and properties and uses of steels. Circular is No. 495, "Heat Treatment and Properties of Iron and Steel" by S. J. Rosenberg and T. G. Digges, and may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, for 25 cents per copy.

* * *

ONE PRODUCER of cast aluminum alloy driers for core baking states that his experience has been that an aluminum alloy containing 5 to 6 per cent silicon has much less growth than others due to the repeated heating and cooling occurring in use. Others have found that a triple heat treatment before use holds the growth to a minimum. Heat treatment involves heating to 50 or 100° above the highest temperature reached in the baking cycle, and cooling slowly as would occur in use. The driers are subjected to that cycle three times before being placed in operation.

* * *

JIB-MOUNTED electric hoists equipped with specially designed pick-up elements provide rapid and safe flask and mold transportation as well as facilitate shakeout operations.

Photo courtesy Yale & Towne Mfg. Co.

Shown in the accompanying illustration, the pick-up device consists of a 4-in. flat with movable sheaves attached to it, link chains which pass over those and engage the flask trunnions, and a triangular metal piece welded to the center of the flat and drilled to engage the electric hoist hook. Chain and sheave arrangement permits easy rolling over of the flask, while the jib-trolley-mounting makes it possible to service a wide foundry area.

* * *

GRAPHITE fluxing tubes for introduction of gases such as nitrogen, chlorine, argon and helium into molten nonferrous metals and alloys to reduce hydrogen, oxides and inclusions are available in three general types. External diameters of the tubes are 1½ and 2 in. One type is pierced with a ½-in. hole all the way through. Another with the same size bore has a solid end, but the periphery of the tube from ½-in. from the end is drilled transversely with a number of fine holes for emission of the gas. The third type employs a threaded-end tube to which a porous graphite head is attached to permit diffusion of the gas into the metal.

* * *

THREE-YEAR test of 100 subway car compressors to determine relative oil consumption of units treated with colloidal graphite and those not, showed an average oil consumption of 0.1075 gal of oil per 1000 car-miles against 0.2362 gal per 1000 car-miles for those lubricated with ordinary oil or a saving of 54 per cent. Machines were horizontal, single-stage, two-cylinder, splash-feed compressors. It is claimed that the colloidal graphite particles are adsorbed on the metal surfaces which is more easily wetted by oil than is plain metal.

* * *

OLD THEORY that noise is a necessary evil of the manufacturing process is being discarded with the realization that reduction of factory roar is reflected favorably on employees' health charts and production graphs. Harmful effects of noise have long been known to doctors, psychiatrists and the exposed workers, but it is only recently that industrial noise has been classified as an occupational hazard and anti-noise ear stopples suggested as standard safety equipment. Noise is said to accelerate fatigue, slow reflexes, and multiply nervous tension which tend to set the stage for accidents.

* * *

INGENIOUS application of a hitherto unused natural force is the basis of a new self-centering conveyor roll. Developed by E. T. Lorig, Carnegie-Illinois Steel Corp., the self-centering roll is a slightly crowned roll cut transversely at the center. The two halves are fixed to rotate as a unit. Working surfaces of the two parts are approximately horizontal while the axes are at an angle. In this way the planes or lines of force in both halves twist evenly toward the center in the direction of movement, conferring a self-centering action on materials passing over the rolls. Side guides are unnecessary to keep materials or belts on the conveyor.

After rough cleaning and chipping these steel castings are sorted into tote pans and dispatched to grinders for further finishing. Part of a comprehensive system of Logan Conveyors.

Partners of Production Men

Year in — year out — Logan Conveyors are an ever-present aid to foundry production personnel, from operators to supervisors.

It is a "partnership" which could develop only with dependable handling equipment.

Two generations of service to the foundry industry qualify Logan engineers and fabricators to produce conveyors which will take the gaff, perform efficiently and make economies in time, effort and space right down the line. Logan is a good name to specify.

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Nodular Iron Conference . . . shows considerable progress in materials, metallurgical and commercial development but need for more research

By WILLIAM G. GUDE
Managing Editor
THE FOUNDRY

EXTENT of the research devoted to nodular iron in the brief period since that material first attracted universal attention was evidenced at the recent conference sponsored by Massachusetts Institute of Technology on the subject. The meeting, held at Swampscott, Mass., Sept. 12-13, was participated in by about 65 metallurgists and engineers. The program, arranged under the direction of Howard F. Taylor of M. I. T., comprised eight papers covering many aspects of nodular iron metallurgy, and was opened by a brief welcoming address by Prof. John Wulff, head, metal processing laboratory, Metallurgy Department, M. I.T.

Among the speakers were H. Morrogh, British Cast Iron Research Association, Birmingham, England, well known for his development work in spherulitic graphite iron through cerium additions, and Prof. Albert De Sy, University of Ghent, Belgium, who also has done considerable research in nodular iron.

Some Theories Conflict

The discussion as a whole revealed that much has been accomplished in a relatively short time in developing metallurgical facts concerning the production and application of nodular iron. But, as might be expected, it was equally apparent that much more research work remains to be done—not only in reconciling some of the conflicting theories advanced by metallurgists for the manner in which graphite nodules are formed, but also in developing the most economical, fool-proof methods for commercial production of consistent quality material.

The recurring question of the most appropriate name for so-called nodular iron received no more than passing mention at the conference. Mr. Morrogh prefers the term "spherulitic graphite"—and with some justification — while others hold to "nodular graphite" or "ductile iron."

While much of the conference discussion was concerned with theoretical matters and experiments still confined to the laboratory, the practical side of the subject also received attention. Speaking on the present status of ductile iron, A. P. Gagnebin, International Nickel Co., New York, termed it as being in its "healthy infancy." Production this year he estimated at 15,000 to 20,000 tons. Licensees under International Nickel patents covering magnesium-containing iron total about 100 companies operating 300 foundries. Approximately one-fourth of these companies are located abroad.

Mr. Gagnebin showed slides of ductile iron castings in a wide range of sizes and types. These included some in which the material's combination of high physical properties and good castability resulted in a new engineering application for a cast product. Service data on certain ductile iron castings, he said, show superior wear resistance compared with steel forgings, and favorable results from the standpoints of both heat resistance and machinability.

Possibility that the basic-lined cupola will play an important part in future production of nodular iron was indicated in a talk by C. K. Donoho, American Cast Iron Pipe Co., Birmingham, describing the comprehensive work that company has done with magnesite brick refractory. With the addition of a calcium carbide flux it has been found possible to produce the low sulphur and low phosphorus content irons desired for nodular treatment. In addition, the carbide effects increased temperature and higher carbon pickup in the metal. Work on this subject at Acipco was done with a 23-in. experimental cupola, but the company is starting commercial production with a 42-in. furnace, and Mr. Donoho stated more economical operations may result with a unit larger than the experimental one.

In discussing the mechanism of spherulitic graphite formation, H. Morrogh pointed to the lack of evidence that the center of the spherulite is any material other than graphite. On the other hand, J. E. Rehder, Bureau of Mines, Ottawa, Canada, arrived at contrary tentative conclusions as the result of studies of the core or nucleus of the nodule. He expressed the belief that some hard, relatively inert nucleus always is present about which the nodule or spherulite is formed.

As mentioned by Mr. Morrogh and other speakers, nodules can be formed in iron by the addition of various carbide stabilizing agents other than magnesium or cerium. Effect of these agents has been studied by a number of investigators. Prof. De Sy pointed out that good results were obtained with lithium-treated iron; however, the harmful fumes generated discouraged its use. In general, good nodular iron is obtainable with silicon, calcium, strontium and barium—in addition to cerium and magnesium. Tellurium, sodium, potassium and boron give partial nodulizing effect. To date magnesium has remained the preferred agent for economic considerations and its adaptability to both hypoeutectic and hypereutectic irons.

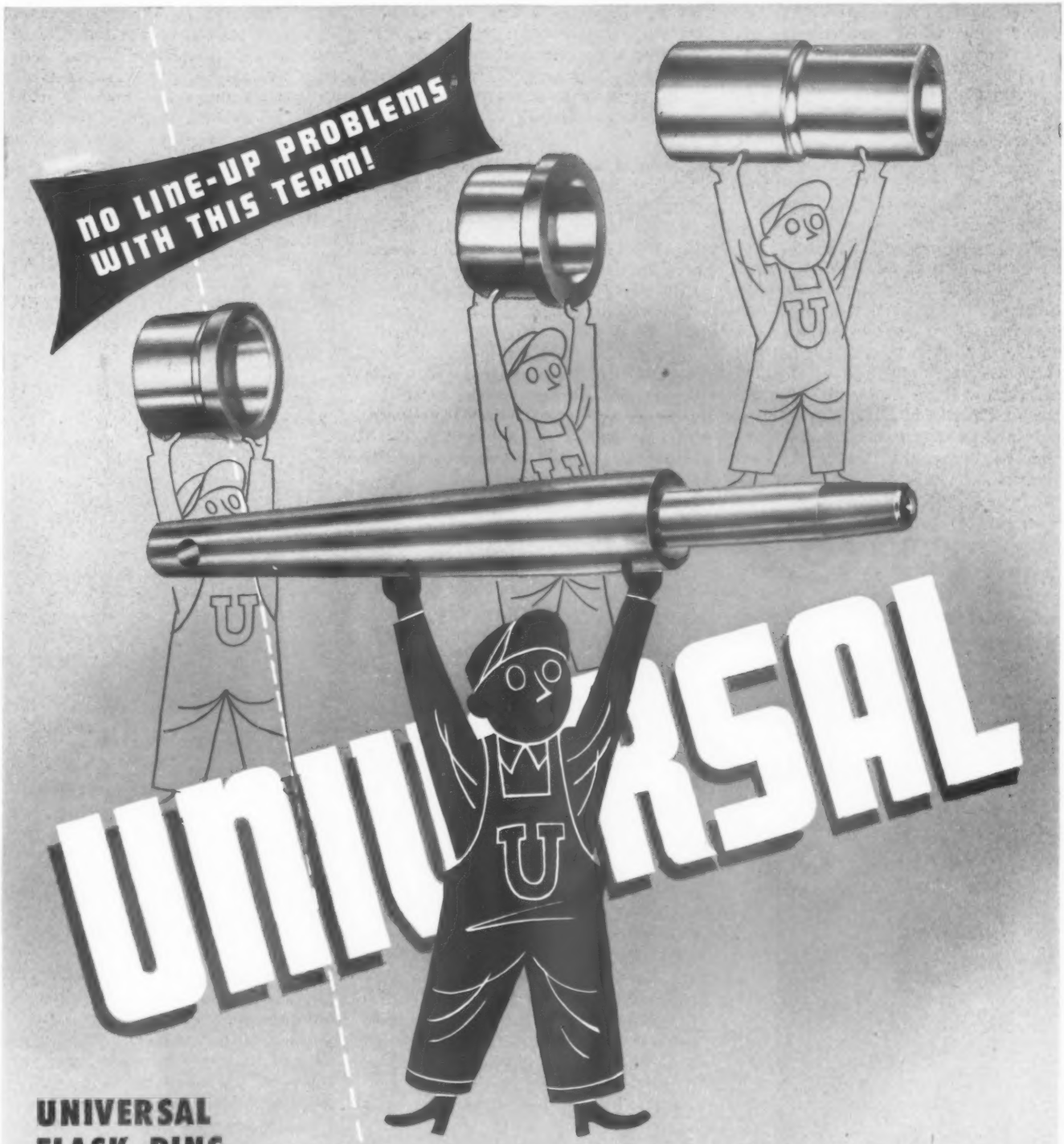
Effect of Residual Magnesium

Harold Bogart, Ford Motor Co., Dearborn, Mich., presented some informative data on the relationship of varying amounts of residual magnesium to physical properties of nodular iron in different section thicknesses. Optimum properties were obtained with a magnesium content of approximately 0.035 to 0.036 per cent. Mr. Bogart emphasized the need for careful control of metal chemistry, melting practice and nodulizing addition if large volume commercial production is to be attained.

Preliminary to the conference discussion on nodular iron, an interesting review of the formation mechanism of flake graphite in cast iron was given by Dr. A. Boyles, U. S. Pipe & Foundry Co., Burlington, N. J. He described the different types of flake graphite, the steps in formation of the flakes, factors influencing the progression in freezing and graphite flake size, as well as the role of inoculants.

In addition to general references by various speakers to nodular iron heat treatment, one paper on this subject was presented by Dr. B.

(*Concluded on page* 158)



UNIVERSAL FLASK PINS, BUSHINGS, and CLOSING PINS for perfect alignment of cope and drag

Here is a team that has helped eliminate cope and drag problems in many foundries — Universal Flask Pins, Bushings and Closing Pins. Cope Bushings are quickly guided to the Drag Pins over tapered, loose-fitting Closing Pins which are quickly removed after assembly. Special design of Elongated Flask Bushing permits longitudinal expansion to compensate for metal heat, without affecting accurate alignment. Round, elongated, press fit and taper types for cast iron, steel, aluminum and magnesium flasks are available for immediate delivery in several sizes. Special types and sizes to order. Write for complete information.

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(*Concluded from page* 156)

Floyd Brown of M.I.T. This included a description of the types of matrices for maximum tensile strength and maximum ductility. He also showed a time-temperature chart covering the formation of ferrite which offers a means of selecting maximum ductility or strength for specific applications of the iron.

The conference dinner had Prof. John Chipman, head, Metallurgy Department, M.I.T., as its principal speaker. Prof. Chipman detailed the fundamentals of desulphurization and described tests to determine the ability of different composition irons to release sulphur. He also explained the desulphurization reaction for the blast furnace and basic electric furnace and the effects of acid and basic slags in this regard. Oxygen in MnO retards desulphurization action of basic slag, while SiO_2 also interferes with sulphur reduction.

OBITUARY

DAVID G. ANDERSON, 65, for more than 40 years associated with the foundry industry, died Sept. 10, in Clarendon Hills, Ill. For the last 9 months Mr. Anderson had been associated with the Foundry Division, Hansell-Elcock Co., Chicago, in sales

DAVID G. ANDERSON

and engineering. Prior to that he was a foundry consultant, following two years as consulting foundry engineer on the staff of the National Foundry Association, Chicago, and over 20 years as chief foundry engineer at the Chicago plant of Western Electric Co. Inc. His earlier connections included Ohio Malleable Iron Co., Columbus, O., and Pittsburgh Engineering Co., Pittsburgh. He contributed to advancement of foundry practice by numerous patents which he originated and by presentation of technical papers before engineering societies. An active member of the American Foundrymen's Society, he had been president of the Chicago Foundrymen's Club, a forerunner of the Chicago Chapter of the AFS.

* * *

Thomas R. Walker, 59, chief chemist and technologist, English Steel Corp. Ltd., Sheffield, England, died July 26. Educated at Cambridge, Mr. Walker joined the Sheffield staff of Cammell, Laird & Co. in 1915. In 1930 when the company joined Vickers-Armstrongs Ltd. to form the English Steel Corp., he was appointed chief chemist. He had been honorary secretary-treasurer and president of the Sheffield branch of the Institute of British Foundrymen. His work was recognized at the Buxton Conference of the IBF this year by award of a Meritorious Service Medal.

* * *

Francis E. Bash, 57, assistant vice president, Driver-Harris Co., Harrison, N. J., died Sept. 14. Mr. Bash was graduated from University of Wisconsin with a degree in chemical engineering and began his career with Leeds & Northrup, Philadelphia. In 1923 he joined the Electrical Alloy Co., Morristown, N. J., which was acquired by Driver-Harris Co. in 1925. In charge of the technical department of Driver-Harris Co., Mr. Bash was noted for his metallurgical experiments and developments.

* * *

Joseph A. Horne, 82, chairman of the board of directors, Yale & Towne Mfg. Co., New York, died Oct. 3, in Stamford, Conn. A native of England, Mr. Horne joined Yale & Towne in 1892. Beginning as a foreman he successively became department superintendent, superintendent of the Stamford plant, vice president and general superintendent, vice president in charge of production, acting president during World War I, and since 1943, board chairman.

* * *

Timothy M. O'Brien, former foundry superintendent, Clark Bros. Co. Inc., Olean, N. Y., died there Aug. 11. Mr. O'Brien, a native of Ireland, joined Clark Bros. in Belmont, N. Y., in 1896. When the company was moved to Olean in 1914 he continued his employment until his retirement early this year. Mr. O'Brien was an active member of the Western New York Chapter of the AFS.

* * *

A. Oakleigh Bush, since 1944 chief sales engineer of the Abrasive Division, Norton Co., Worcester, Mass., died Sept. 2. Mr. Bush joined the research laboratory of the Niagara Falls plant in 1924, following graduation from Massachusetts Institute of Technology. Since 1928 he had been with the sales departments, serving as general manager of the Norton plant in Welwyn Garden City, England, and as assistant and chief sales engineer in Worcester.

* * *

Henry L. Demmler, 80, general manager, William Demmler & Bros., Kewanee, Ill., died Sept. 19 in Chicago. Mr. Demmler was born in Pittsburgh and went to Kewanee in 1900. In 1904 he was one of the founders

HENRY L. DEMMLER

of Wm. Demmler & Bros. and was engaged in the manufacture of foundry equipment for over 40 years. He pioneered in the development of the coreblowing machine, an important contribution to the advancement of the foundry industry.

* * *

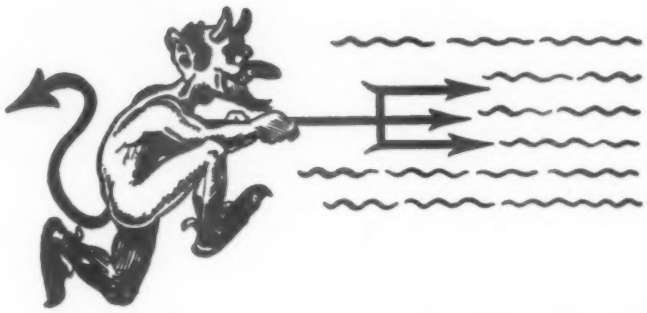
Frank E. McIntyre, 78, for many years connected with the steel casting industry, died Sept. 21, at the Masonic Home, Dousman, Wis., where he had lived for 10 years. Mr. McIntyre, a native of Vermont, retired in 1930, following 30 years as general foundry superintendent for the former National Brake & Electric Co., Milwaukee.

* * *

Joseph P. Dunphy, 59, who served as superintendent of West Michigan Steel Foundry Co., Muskegon, Mich., from 1930 to 1940, died Sept. 27 at his home there. Mr. Dunphy was associated with Otis Elevator Co., Buffalo, prior to his retirement several years ago because of illness.

* * *

Eugene Oehring, 29, general foreman of the maintenance department at the Danville, Ill., malleable plant, Central Foundry Division, General Motors Corp., died Sept. 8.



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KEEPS FEEDING METAL MOLTEN 50% LONGER

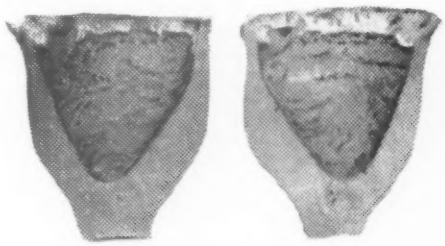
SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER is the leader in major foundries for use on ferrous and non-ferrous metals, and in ingot production. It is the first and the original scientific non-carbon exothermic compound for feeding heads and risers.

SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER is different from ordinary head compounds in two ways: It is CARBON FREE, thereby eliminating carbon pick-up. It is EXOTHERMIC. Carbonaceous materials, regardless of their composition, will cause carbon pick-up, segregation, non-uniform grain structure and hard spots under risers and in castings. Carbonaceous materials contribute no added heat value or increased temperatures to the feeding metal and only act as an insulating cover.

SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER reacts within itself exothermically, producing a temperature above 3200° F. actually increasing the temperature of the feeding metal to a point well above that of the metal in the main body of the casting, thus ensuring that the feeding metal will be the last to freeze. Shrink cavities in the casting caused by premature freezing of the feeding metal are eliminated. After the exothermic action has ceased, the LIQUIDIZER forms a soft insulating blanket on the metal. This confines the heat generated by the LIQUIDIZER and aids in maintaining the desired high temperature of the feeding metal in the heads.

NOTE THESE TYPICAL RESULTS FROM THE USE OF SOFFEL'S CARBON FREE LIQUIDIZER

This six inch by six inch chrome-nickel-steel riser, with the application of 1 pound of SOFFEL'S CARBON FREE LIQUIDIZER, the average weight was reduced from 32 pounds to 13 pounds, a savings of 19 pounds of saleable metal which normally would have been discarded as scrap, but which was fed into the casting and produced a heavier, sounder casting. Note the feeding head can be knocked off easily saving burning costs. There is no better feeding head compound at any price than SOFFEL'S CARBON FREE LIQUIDIZER.



Soffel's Thermotomic Compound

for all metals and alloys

Patented

SOFFEL'S THERMOTOMIC COMPOUND is an exothermic molding compound which is molded and baked into any desired shapes just as sand cores are made. It is used as ring inserts under the risers or feeding heads and blind riser cracker cores. Also as a facing insert where it is desirable to maintain the fluidity of metal in the mold at those points where rapid cooling may cause piping, shrinkage or segregation. It produces a temperature up to 3500° F. Great savings are realized through the reduction in height of risers as well as the cost of removing feeding heads. SOFFEL'S CARBON FREE LIQUIDIZER should be used on top of the feeding heads in conjunction with the use of SOFFEL'S THERMOTOMIC COMPOUND. For aluminum and magnesium THERMOTOMIC ABC and AL-X31 LIQUIDIZER on top of the heads is recommended. Write for descriptive literature.

BEWARE OF IMITATIONS! We are the originators of CARBON FREE LIQUIDIZER and THERMOTOMIC COMPOUNDS

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WORLD'S LARGEST MANUFACTURERS OF FLUXES AND PURIFIERS FOR ALL METALS AND ALLOYS

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Lower baking out temperature

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"... also since changing over to this oil we have saved considerable expense of using different sands, are using 1/5 less oil and the baking time in the ovens has been reduced approximately two hours at a temperature of about 450 degrees F...."

J. A. Dean, Mgr.
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Nelson Electric Mfg. Co.

Saves time

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WHY not join the growing army of satisfied users of Delco 30 Series Core Oil? Read what representative foundries report:

- "The big difference is in saving time and fuel in the oven, by cutting down both time and temperature—with no sacrifice of results in the finished core."
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- "Best Core Oil I ever used!"
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Results like these should appeal to you, as a profit-minded foundry man. Let our Cities Service representative give you prompt and valuable assistance in choosing and applying the correct grade for your requirements. Cities Service Oil Co., Chicago, Cleveland, Kansas City, St. Paul and Toronto and Arkansas Fuel Co., Shreveport.

Features of Cities Service 30 Series Core Oil that are building preference throughout the industry:

BETTER PERFORMANCE in core boxes, whether blown or hand rammed, whether sand is washed and dried or crude.

FASTER DRYING TIME without recourse to older types of drying oils.

WIDE RANGE OF WORKING TEMPERATURE—ready for use without pre-conditioning whether in Texas or Montreal.

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HAS A CLEAN, PLEASANT ODOR.

MADE IN FIVE QUALITY RANGES accommodating all local foundry and core room conditions.

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TABLES FOR RAPID CONVERSION OF GROSS TONS INTO POUNDS

Pig iron and scrap, two of the most essential foundry raw materials are bought and sold on a basis of gross ton weight. Previous to World War I, many grades of the latter were computed upon a net or 2000-pound ton unit, but through the influence of the government during and since the period of federal control, the gross ton has come to be the accepted standard for all classes of the commodities mentioned. The following tables give the equivalent weight in pounds from 1 to 340 gross tons. The decimal parts of a gross ton are presented in tabular form on page 162.

TABLE SHOWING VALUES OF GROSS TONS IN POUNDS

Tons	Pounds	Tons	Pounds	Tons	Pounds	Tons	Pounds
1	2,240	36	80,640	71	159,040	106	237,440
2	4,480	37	82,880	72	161,280	107	239,680
3	6,720	38	85,120	73	163,520	108	241,920
4	8,960	39	87,360	74	165,760	109	244,160
5	11,200	40	89,600	75	168,000	110	246,400
6	13,440	41	91,840	76	170,240	111	248,640
7	15,680	42	94,080	77	172,480	112	250,880
8	17,920	43	96,320	78	174,720	113	253,120
9	20,160	44	98,560	79	176,960	114	255,360
10	22,400	45	100,800	80	179,200	115	257,600
11	24,640	46	103,040	81	181,440	116	259,840
12	26,880	47	105,280	82	183,680	117	262,080
13	29,120	48	107,520	83	185,920	118	264,320
14	31,360	49	109,760	84	188,160	119	266,560
15	33,600	50	112,000	85	190,400	120	268,800
16	35,840	51	114,240	86	192,640	121	271,040
17	38,080	52	116,480	87	194,880	122	273,280
18	40,320	53	118,720	88	197,120	123	275,520
19	42,560	54	120,960	89	199,360	124	277,760
20	44,800	55	123,200	90	201,600	125	280,000
21	47,040	56	125,440	91	203,840	126	282,240
22	49,280	57	127,680	92	206,080	127	284,480
23	51,520	58	129,920	93	208,320	128	286,720
24	53,760	59	132,160	94	210,560	129	288,960
25	56,000	60	134,400	95	212,800	130	291,200
26	58,240	61	136,640	96	215,040	131	293,440
27	60,480	62	138,880	97	217,280	132	295,680
28	62,720	63	141,120	98	219,520	133	297,920
29	64,960	64	143,360	99	221,760	134	300,160
30	67,200	65	145,600	100	224,000	135	302,400
31	69,440	66	147,840	101	226,240	136	304,640
32	71,680	67	150,080	102	228,480	137	306,880
33	73,920	68	152,320	103	230,720	138	309,120
34	76,160	69	154,560	104	232,960	139	311,360
35	78,400	70	156,800	105	235,200	140	313,600

Tons	Pounds	Tons	Pounds	Tons	Pounds	Tons	Pounds
141	315,840	191	427,840	241	539,840	291	651,840
142	318,080	192	430,080	242	542,080	292	654,080
143	320,320	193	432,320	243	544,320	293	656,320
144	322,560	194	434,560	244	546,560	294	658,560
145	324,800	195	436,800	245	548,800	295	660,800
146	327,040	196	439,040	246	551,040	296	663,040
147	329,280	197	441,280	247	553,280	297	665,280
148	331,520	198	443,520	248	555,520	298	667,520
149	333,760	199	445,700	249	557,760	299	669,760
150	336,000	200	448,000	250	560,000	300	672,000
151	338,240	201	450,240	251	562,240	301	674,240
152	340,480	202	452,480	252	564,480	302	676,480
153	342,720	203	454,720	253	566,726	303	678,720
154	344,960	204	456,960	254	568,960	304	680,960
155	347,200	205	459,200	255	571,200	305	683,200
156	349,440	206	461,440	256	473,440	306	685,440
157	351,680	207	463,680	257	575,680	307	687,680
158	353,920	208	465,920	258	577,920	308	689,920
159	356,160	209	468,160	259	580,160	309	693,160
160	358,400	210	470,400	260	582,400	310	694,400
161	360,640	211	472,640	261	584,640	311	696,640
162	362,880	212	474,880	262	586,880	312	698,880
163	365,120	213	477,120	263	589,120	313	701,120
164	367,360	214	479,360	264	591,360	314	703,360
165	369,600	215	481,600	265	593,600	315	705,600
166	371,840	216	483,840	266	595,840	316	707,840
167	374,080	217	486,080	267	598,080	317	710,080
168	376,320	218	488,320	268	600,320	318	712,320
169	378,560	219	490,560	269	602,560	319	714,560
170	380,800	220	492,800	270	604,800	320	716,800
171	383,040	221	495,040	271	607,040	321	719,040
172	385,280	222	497,280	272	609,280	322	721,280
173	387,520	223	499,520	273	611,520	323	723,520
174	389,760	224	501,760	274	613,760	324	725,769
175	392,000	225	504,000	275	616,000	325	728,000
176	394,240	226	506,240	276	618,240	326	730,240
177	396,480	227	508,480	277	620,480	327	732,480
178	398,720	228	510,720	278	622,720	328	734,720
179	400,960	229	512,960	279	624,960	329	736,960
180	403,200	230	515,200	280	627,200	330	739,200
181	405,440	231	517,440	281	629,440	331	741,440
182	405,440	231	519,680	282	631,680	332	743,680
183	409,920	233	521,920	283	633,920	333	745,920
184	412,160	234	524,160	284	636,160	334	748,160
185	414,400	235	526,400	285	638,400	335	750,400
186	416,640	236	528,640	286	640,640	336	752,640
187	418,880	237	530,880	287	642,880	337	754,880
188	421,120	238	533,120	288	645,120	338	757,120
189	423,360	239	535,360	289	647,360	339	759,360
190	425,600	240	537,600	290	649,600	340	761,600

CONVERSION OF POUNDS INTO DECIMAL PARTS OF A GROSS TON

To reduce railroad weights in pounds to tons and decimal fractions this table saves much computation. Assuming a carload of pig iron, scrap or coke weighs 90,680 pounds, the table on page 161 shows that 40 tons is 89,600 pounds, leaving a remainder of 1080 pounds, which the following table indicates is 0.4821-ton. The total carload therefore is 40.4821 tons. Multiplication by the cost per ton gives the exact cost of the carload and multiplication by the freight rate gives the exact charges.

Pounds	Decimal	Pounds	Decimal	Pounds	Decimal	Pounds	Decimal
1	0004	160	0714	410	1830	660	2946
2	0009	170	0759	420	1875	670	2991
3	0013	180	0804	430	1920	680	3036
4	0018	190	0848	440	1964	690	3080
5	0022	200	0893	450	2009	700	3125
6	0027	210	0938	460	2054	710	3170
7	0031	220	0982	470	2098	720	3214
8	0036	230	1027	480	2143	730	3259
9	0040	240	1071	490	2188	740	3304
10	0045	250	1116	500	2232	750	3348
15	0067	260	1161	510	2277	760	3393
20	0089	270	1205	520	2321	770	3438
30	0134	280	1250	530	2366	780	3482
40	0179	290	1295	540	2411	790	3527
50	0223	300	1339	550	2455	800	3571
60	0268	310	1384	560	2500	810	3616
70	0313	320	1429	570	2545	820	3661
80	0357	330	1473	580	2589	830	3705
90	0402	340	1518	590	2634	840	3750
100	0446	350	1563	600	2679	850	3795
110	0491	360	1607	610	2723	860	3839
120	0536	370	1652	620	2768	870	3884
130	0580	380	1693	630	2813	880	3929
140	0625	390	1741	640	2857	890	3973
150	0670	400	1786	650	2902	900	4018

Pounds	Decimal	Pounds	Decimal	Pounds	Decimal	Pounds	Decimal
910	4063	1260	5625	1610	7188	1960	8750
920	4107	1270	5670	1620	7232	1970	8795
930	4152	1280	5714	1630	7277	1980	8839
940	4196	1290	5759	1640	7321	1990	8884
950	4241	1300	5804	1650	7366	2000	8929
960	4286	1310	5848	1660	7411	2010	8973
970	4330	1320	5893	1670	7455	2020	9018
980	4375	1330	5938	1680	7500	2030	9063
990	4420	1340	5982	1690	7545	2040	9107
1000	4464	1350	6027	1700	7589	2050	9152
1010	4509	1360	6071	1710	7634	2060	9196
1020	4554	1370	6116	1720	7679	2070	9241
1030	4598	1380	6161	1730	7723	2080	9286
1040	4643	1390	6205	1740	7768	2090	9330
1050	4688	1400	6250	1750	7813	2100	9375
1060	4732	1410	6295	1760	7857	2110	9420
1070	4777	1420	6339	1770	7902	2120	9464
1080	4821	1430	6384	1780	7946	2130	9509
1090	4866	1440	6429	1790	7991	2140	9554
1100	4911	1450	6473	1800	8036	2150	9598
1110	4955	1460	6518	1810	8080	2160	9643
1120	5000	1470	6553	1820	8125	2170	9688
1130	5045	1480	6607	1830	8170	2175	9710
1140	5089	1490	6652	1840	8214	2180	9732
1150	5134	1500	6696	1850	8259	2185	9754
1160	5179	1510	6741	1860	8304	2190	9777
1170	5223	1520	6786	1870	8348	2195	9799
1180	5268	1530	6830	1880	8393	2200	9821
1190	5313	1540	6875	1890	8438	2205	9844
1200	5357	1550	6930	1900	8482	2210	9866
1210	5402	1560	6964	1910	8527	2215	9888
1220	5446	1570	7009	1920	8571	2220	9911
1230	5491	1580	7054	1930	8616	2225	9933
1240	5536	1590	7098	1940	8661	2230	9955
1250	5580	1600	7143	1950	8705	2235	9978

Model No. 217

WHEN YOU SPECIFY MILWAUKEE MOLDING MACHINES

Designed by ***experienced foundrymen*** for foundry production operations, MILWAUKEE jolt-squeeze-rollover-draw machines feature maximum production efficiency, simplified control, and a rapid operating cycle.

Three standard sizes are available to meet a wide range of drag-mold production requirements. Maximum flask capacities range from 33 x 32 inches on smallest model to 47 x 47 inches on the largest. Model No. 217 (illustrated) will handle flasks up to 41 x 35 inches in dimension.

MILWAUKEE jolt-squeeze-rollover-draw machines incorporate conveniently located control valves, rigid frames and tie pieces to assure parallel squeeze, cast steel cradle, and a roller conveyor frame that rests on four hydraulic pistons. Jolt mechanism, squeeze cylinder, and leveling device are integral parts of heavy machine base. Flask clamp assemblies are mounted on cradle-ways to facilitate rapid, accurate adjustment, and two aligned rods guide cradle during jolting, squeezing, and pattern draw operations.

With production ***speed*** and ***savings*** the keynotes of today's highly competitive markets, MILWAUKEE molding machines are the most modern equipment available for the production of heavy drag molds of uniform standard. *When you buy, specify MILWAUKEE equipment* . . . and you will have **PRODUCTION PROFITS IN YOUR HANDS! Write for Bulletin No. 115**

Milwaukee-Taccone Model 3-A Core Blower is described in detail in Bulletin 119-A. Operational features of this fully automatic, explosion-type core blower are illustrated by photos and specification charts.

Bulletin 113 contains specification and drawings on 9 types of plain jolt machines, which have capacities ranging up to 10,000 pounds. Dimensions and shipping weights also are listed.

Four models of car-type jolt-squeeze-strip cope making machines are presented in Bulletin 121. Over-all specifications and dimensions, as well as detailed drawing of overhead carriage, are included.

SPO

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ALL CANADIAN FOUNDRY CONFERENCE

At Hamilton, Sept. 28-30, Draws 400

CANADIAN foundrymen met at the Royal Connaught hotel, Hamilton, Ont., Sept. 28-30, for the Third All-Canadian Conference. Approximately 400 attended. A sand course, sponsored by Harry W. Dietert Co., Detroit, and conducted throughout the conference by Frank Brewster of that company, drew a record registration of 160.

J. J. McFadyen, general manager, Galt Malleable Iron Co., Galt, Ont., and a national AFS director, presided at the opening luncheon on Thursday. He introduced Helen Faircloud, acting mayor of Hamilton, who welcomed the visitors in the absence of Mayor Lloyd Jackson. Mrs. Faircloud, whose recent election to Parliament makes her the first and only woman to become a member of that group, called for more active participation by businessmen as citizens in selling and perpetuating the free enterprise system.

By ROBERT H. HERRMANN
Associate Editor
THE FOUNDRY

At the first of five sessions comprising the sand course, Mr. Brewster discussed some of the basic principles, uses and reasons for control of foundry core and molding sand. Sand control is a specialized study and it should be under the control of one man regardless of whether he devotes full or part time to the task. His job is to provide the right sand in the right amount at the right time. Benefits of a sound sand control program are to be found in reduction of casting losses and improvement in quality. The proper sand control program involves day-to-day control through inspection of raw materials to insure uniformity and record keeping so that the causes of yesterday's losses can be traced and steps taken to prevent tomorrow's losses. Proper control also involves research into new materials and methods.

Control fundamentals rest on the basic principle that there is a best range for each sand property, and this range is influenced by local conditions and practices. Any complete set of properties represents compromises, and many properties change with use of sand and may upset original expectations. Mr. Brewster stated that it is better to maintain properties than to maintain the mix set up for the original formulation. Sand which is reused retains certain additives, which will build up if identical additions are made regularly as the sand is reused. This results in changed properties of the sand mix.

Discussion brought forth the comment that every sand property is affected by moisture, making it one of the most important ingredients in the mix. Water should be measured by a meter and not with an old beat-up can when formulating the mixture. Furthermore, knowing the temperature of the sand going into the mill will help in proper moisture control. A practical method of moisture control when heap sand is being tempered is to furnish the sand man with three cans of sand—one with the correct moisture content; one too dry, and one too wet. By taking a handful of each the man can compare the feel with the heap sand he is mixing.

Remaining sessions were devoted to a detailed discussion on setting up a sand control program, various types of sand testing equipment and their uses, sand properties and their con-

(*Continued on page* 167)

Cast Iron Stove Is Over 200 Years Old

FORERUNNER of Canada's more than 500 foundries, which include gray iron, steel, malleable, aluminum, brass and bronze and magnesium shops, was Les Forges St. Maurice established by Poulin de Franchville in 1730. Bog iron ore was discovered 7 miles west of Three Rivers where today the village of St. Maurice Forges is located. While early settlers were seeking home sites in the wilderness, an industry was established that later grew to employ 800 persons.

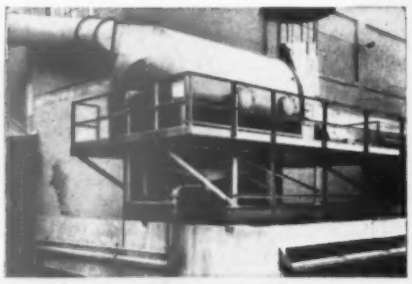
Here were produced axes, spades, shovels and plows as well as stoves, pans, porridge pots and utensils for the settlers' homes.

One particular stove, that of Capt. Joseph Brant, the Mohawk Indian chieftain, whose home was situated on Lake Ontario near the site of Burlington, remains as an example of their craftsmanship. More than 200 years old, it still is in useable condition and provided Canadian foundrymen an excellent example to illustrate the slogan, "Good castings are permanent" while on display during the recent All-Canadian Foundry Conference.

The Forges were forced to close when the supply of bog ore was exhausted in 1880 after operating for 150 years.

Examining Captain Brant's stove, which is more than 200 years old, are R. H. Williams, Canadian Westinghouse Co. Ltd., and J. Waumsley, curator, Brant Museum, Burlington, Ont. This stove was exhibited during the All-Canadian Foundry Conference held in Hamilton, Ont., Sept. 28-29-30

For most effective dust suppression ... USE WATER!

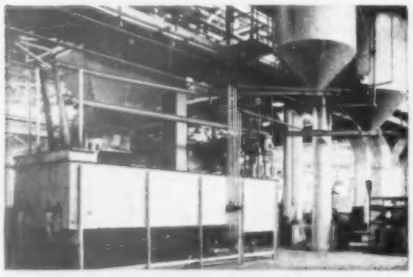


Typical outdoor installation of horizontal-type Hydro-Clone. Bottom pipes lead to sludge tank.

Whiting Hydro-Clones are based on wet suppression, reducing foundry dusts to harmless sludge and absorbing most of the noxious gases.

This equipment is built by foundrymen for foundrymen. Whiting knows foundry dust suppression needs and how to meet them by stopping dust at its source.

If dusts from weigh hoppers, shakeouts, tumbling mills, and sand-handling contaminate your air, you will be amazed to learn how effectively and inexpensively these dusts can be controlled. Consult Whiting.



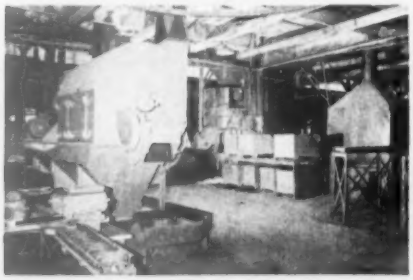
Two vertical-type Hydro-Clones suspension-mounted to save floor space.

Conveyor hood draws off steam and dust from casting conveyor at dumping point.

WHITING CORPORATION

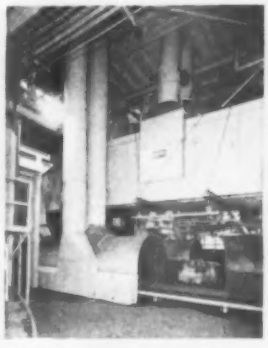
15607 Lathrop Ave. Harvey, Illinois

Offices in Chicago, Cincinnati, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, and St. Louis. Representatives in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, N. Y.

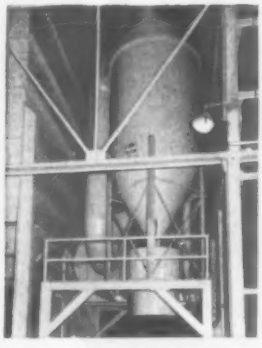


"CH" Hydro-Clone collects dust from shakeout and sand-handling systems.

Cope shakeout and louvre system at flask breaking.



Mold conveyor enclosure, exhaust and return air system which conserves foundry heat.



Type "D" Hydro-Clone used to collect dust from coke, stone, and iron weigh hoppers.

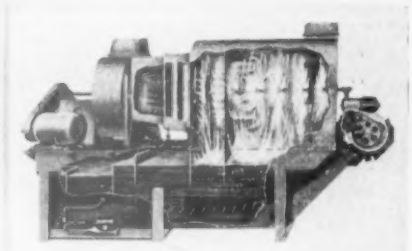


Diagram shows how swirling dust-laden air meets water sprays in Hydro-Clone.

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- Invaluable data on the right accessory—guide roller attachment, flash circle burner, hose connections, couplings, and so on—for the job at hand.

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(*Continued from page* 164)
trol, defects and their elimination, and suggested sand formulas.

R. G. Williams, Canadian Westinghouse Co., Hamilton, presided at the opening dinner Thursday. Walter L. Seelbach, president, Superior Foundry Inc., Cleveland, spoke briefly on "What United States Businessmen and Especially Foundrymen Think About the Future." He stated that the future leads to World War III or to establishment of North America as an armed camp to enforce peace. Both courses mean expanded production in which foundries will play an important part because of the universal use of castings.

Principal speaker was Bruce Simpson, National Engineering Co., Chicago. His topic, "History and Development of the Foundry Industry," was presented as a running commentary to a group of slides tracing advancement of foundry knowledge from early discoveries of metal. Foundry equipment used and castings produced in the various eras of development were shown. Mr. Simpson concluded by pointing out that throughout history the progress of civilization has gone hand in hand with progress of the foundry industry.

Harold N. Bogart, research engineer, Ford Motor Co., Dearborn, Mich., spoke at the ferrous session on Friday. His subject was "Up-to-date Melting Mediums for Cast Iron, Malleable, and Steel." J. Perkins, Ford Motor Co. of Canada Ltd., Windsor, Ont., was chairman. Mr. Bogart described current developments leading to improved melting units.

With cupolas, water cooling has significance in reducing refractory cost. Mr. Bogart described experience with the Renshaw cupola developed in England. It utilizes water-cooled steel plates in the melting zone. He also mentioned that a cupola which is cooled by water externally is operating in Liege, Belgium. Linings in this cupola experience practically no wear.

The use of oxygen in the blast is advantageous when it is desired to get the cupola up to temperature quickly when it is not operating properly. However, it is uneconomical for continuous operation.

Covered cupolas are getting greater recognition because of stress being laid on the air pollution problem. Devices for indicating metal height in the cupola also are important. Mr. Bogart's company has done some experimenting with radioactive cobalt used in conjunction with a Geiger counter as a metal height indicator.

The speaker discussed oxygen lancing for reducing carbon in electric furnace operation in steel foundries. He stated that use of oxygen increases recovery of chromium and manganese and that melting results are more reproducible.

In discussing multiplexing, he said that such processes are uneconomical unless there is need for a specialty type iron for the production of certain products.

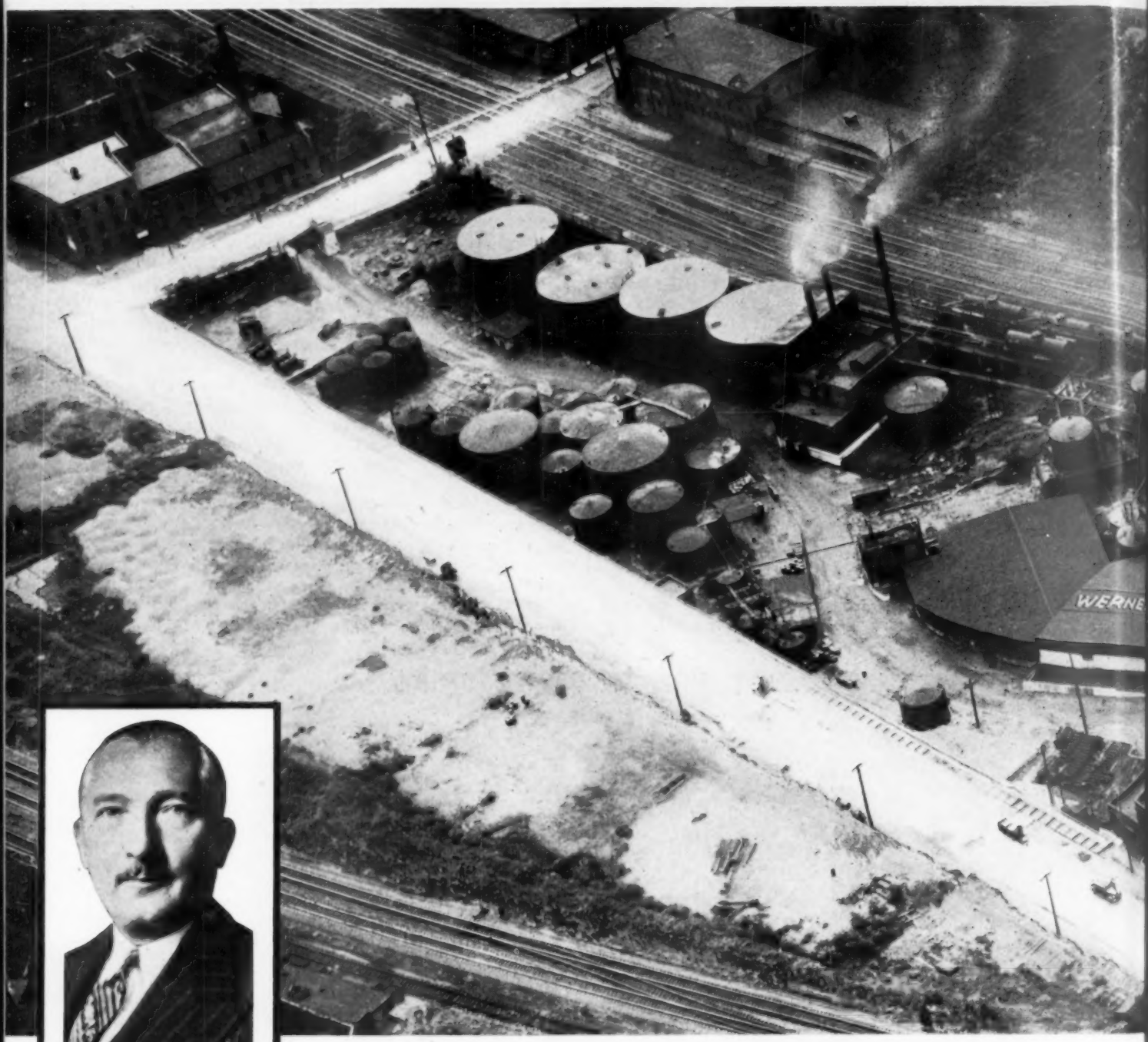
At the nonferrous session Friday, James G. Dick, chief metallurgist, Canadian Bronze Co., Montreal, discussed "Melting of Brass and Bronze." Frank B. Diana, Z. Wagman & Son Ltd., Toronto, was the scheduled chairman.

Mr. Dick stated that an efficient melting unit and an efficient melting procedure are essential in producing sound brass and bronze alloy castings. The efficiency of any melting furnace depends upon its ability to provide consistently, with careful operating procedure, melts free from gases or other substances capable of causing unsound castings. Production of gas-free melts depends on the nature of the charge, condition of the

(*Concluded on page* 170)

SCHOOL EXHIBIT: Hackley Manual Training School, Muskegon, Mich., in co-operation with Western Michigan Chapter of the AFS and George W. Cannon, foundry leader, recently sponsored the exhibit shown above in the local Sears, Roebuck & Co.'s store window. The exhibit, containing foundry products ranging from machine castings to art objects, illustrated work done in the school's foundry

Here's Our Plant Now Making The



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(*Concluded from page* 167)

furnace lining, and the type of atmosphere in the furnace during melting.

With respect to gassing, the speaker said that hydrogen is one of the most dangerous gases because of its high solubility in molten copper-base alloys, increasing with increasing temperature; its low solubility in copper-base alloys in their solid state, and its ability to combine, at high temperatures, with certain metallic oxides to produce water vapor. It originates in the melt as a product of incomplete combustion of hydrocarbon fuels such as gas or oil; it is produced by breakdown of water vapor at furnace operating temperatures, and it originates by the reducing action at furnace operating temperatures of carbon or carbon monoxide on water vapor.

In discussing procedures in melting practice, Mr. Dick stated that melting units should be charged in such a manner as to permit rapid melting with low losses. Materials charged should be clean of all contaminants. Heavier pieces should be charged first, then melted and the lighter components charged into the molten metal.

Mr. Dick is opposed to the use of melt covers because they prevent proper contact between the melt and minor quantities of oxygen in the furnace, thus interferring with hydrogen oxidation. He went on to say that furnace atmospheres should be slightly oxidizing. Overheating of the melt should be avoided, and the melt should not be left in the furnace after it has reached withdrawal temperature.

He then discussed deoxidizers and degassers and the procedures involved in deoxidizing and degassing various alloys. In conclusion, Mr. Dick discussed advantages and disadvantages of various types of melting equipment.

Murray N. Tallman, A. H. Tallman Bronze Co., Hamilton, and chairman of Ontario Chapter of the AFS, presided at the banquet Friday evening. Brief talks were made by H. F. Scobie, editor, *American Foundryman*, and L. Guilmette, Canadian Foundry Supplies & Equipment Co., Montreal, and chairman of Eastern Canada Chapter of the AFS. J. H. King, Werner G. Smith Ltd., Toronto, and past chairman of Ontario Chapter, introduced the principal speaker of the evening, E. A. McFaul, Chicago.

Mr. McFaul's topic was "What Is Your Washroom Rating." He spoke in an entertaining vein on how to understand people and get along with them, particularly in employee-employer relationships.

A lecture on "Nodular Iron" concluded the conference. Dr. A. L. DeSy of Belgium was the speaker, and J. E. Rehder, Bureau of Mines, Ottawa, Ont., was chairman.

Dr. DeSy described results of experiments he has made using lithium, calcium, strontium and barium additions to an iron-carbon-silicon alloy to produce nodular iron.

He stated that nodular iron now has been made with the following deoxidizers and desulphurizers: Cerium, magnesium, silicon, calcium, strontium and barium. Partial results have been obtained with sodium, potassium, tellurium, and boron.

Magnesium Best Alloy

Dealing with magnesium alloys, which he said were best for industrial application because of technical and economic reasons, he stated that more than 60 different alloys on the basis of one, two or three of the good carbon, nickel, copper, and silicon additions have been studied systematically for magnesium recovery and cost of treatment. Very good recovery was obtained with nickel, magnesium and calcium alloys containing more than 80 per cent nickel, 1 to 2 per cent carbon and 15 to 17 per cent magnesium. The cheapest treatment, however, involves the use of silicon-base alloys containing about 17 per cent magnesium and 48 per cent silicon. Alloys of 10 to 15 per cent nickel and 20 to 25 per cent iron, containing both magnesium and calcium, have shown promising results.

He went on to say that high strengths are obtained easily, but to obtain high ductility (elongation of at least 20 per cent after ferritizing annealing) it is important that the phosphorus, manganese and sulphur in the metal to be treated be as low as possible. It is believed that the basic cupola is going to be very useful as melting apparatus for the nodular iron bases.

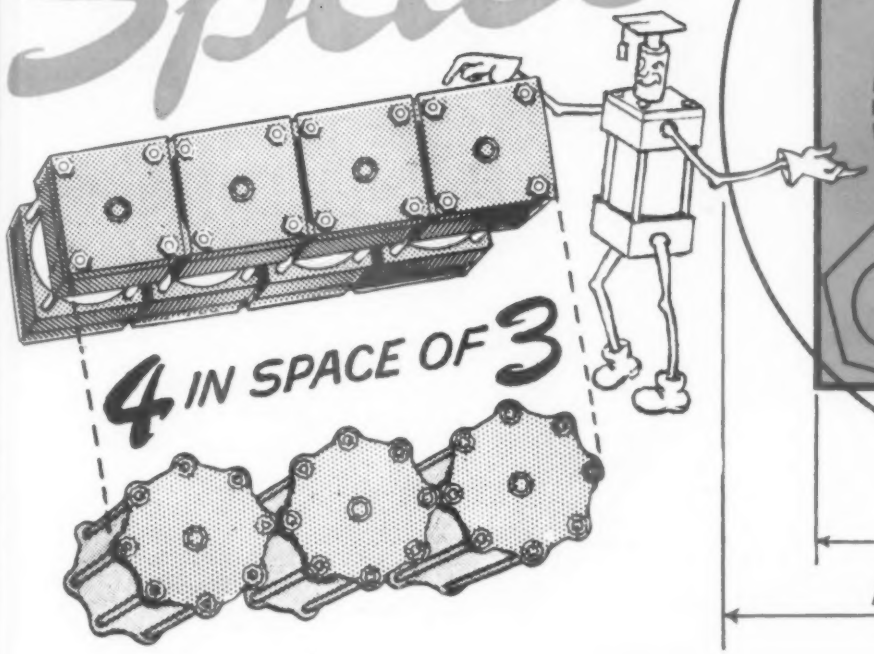
During the discussion period, Dr. DeSy said that he added magnesium in lumps about 3 in. in diam to 1000 lb of metal. Recoveries were 25 to 30 per cent. He also stated that aluminum counteracts the effect of nodulizing additions.

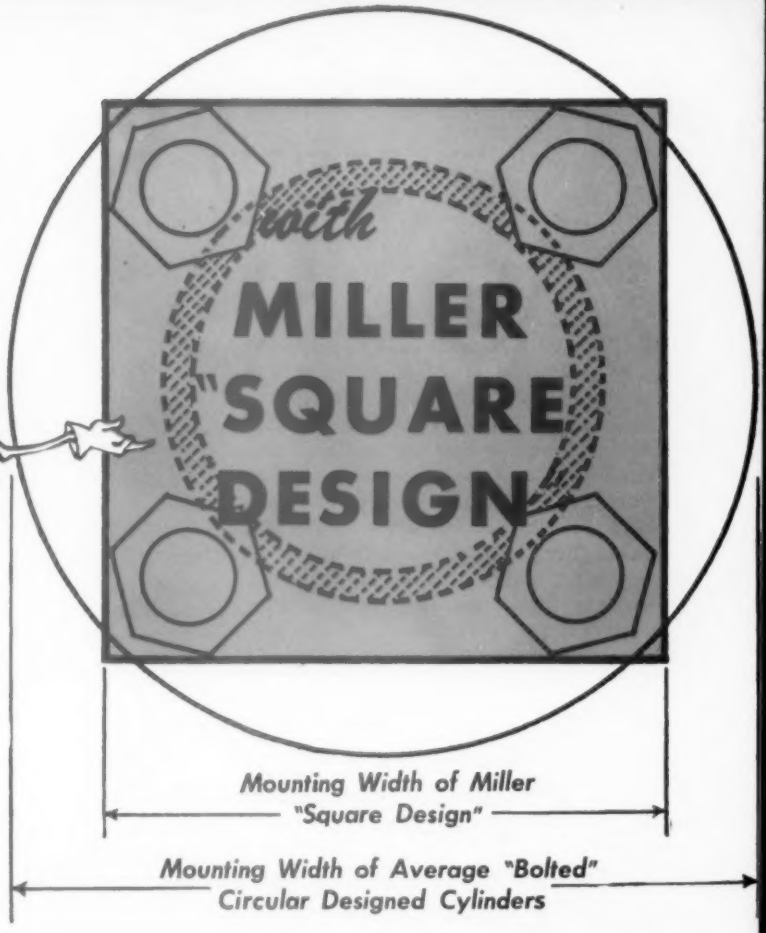
Establishes New Sales Trainee Grinding School

NORTON Co., Worcester, Mass., has a new and fully equipped grinding school, designed to teach practical application of grinding and allied abrasive processes to its own sales trainees and plant supervisory personnel. Grinding machines and grinding equipment, representing all major types of grinding, have been laid out in addition to classrooms, conference rooms, offices, exhibits, instrument and stock rooms. Portable bleachers for easy trainee observation are part of the classroom equipment.

Six full-time personnel carry out administrative and basic training functions, supplemented by engineering, research and service specialists from the company's several divisions. Every attempt is made to keep classes to a maximum of 12 trainees. Courses range from one to 55 weeks. During a typical year 150 distribtuors' salesmen and 100 customers' men will receive instruction in the school, plus about 10 sales trainees. Management responsibility for the school is under guidance of Wallace T. Montague, vice president and manager of business planning and development.

Save Space





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The illustration at upper left shows graphically how *four* Miller Cylinders can be mounted, bore for bore, in the same space required for *three* average "bolted" circular designed cylinders. Some Miller bore sizes permit even greater space-savings.

Other important *standard* features of all Miller Cylinders include: solid steel heads, caps and mountings, hard chrome plated piston rods, dirt wiper seals, and other "quality" features as shown in illustrated bulletins sent FREE on request. Remember, too, that Miller Hydraulic Cylinders (2000-3000 psi) meet the J. I. C. Hydraulic Standards.

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Write for illustrated cylinder bulletins A-105 and H-104

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A NEW Type of CUPOLA

New type of cupola developed by the author's firm was described in a paper presented before the Italian Metallurgical Association, Milan, Italy. Because of its special characteristics, the melting unit has been given the name "Metallurgical Blast Cupola"

By ROBERT DOAT
Compagnie General des Conduites d'Eau
Liege, Belgium

ORIGINAL conception of the melting unit to be described evolved from a slagging gas producer blown with a high-temperature blast, installed in 1925 at the Societe des Houillieres de Saint-Etienne by a French technician, Mr. Philippon. This plant operated from 1925 to 1935 and generated 200,000 cu m of gas per 24 hr which was utilized for operating a glass melting furnace. This producer used a fuel with a high ash content which also was ferruginous and it was observed that liquid iron ran at the bottom of the gas producer with the slag. This suggested the idea of adding some steel scrap to the burden of the producer and the result was a production of gas as the main product and of cast iron as a byproduct.

By progressively increasing the additions of metallic charges the plant operated somewhat as a cupola and produced cast iron as the main product and gas as a byproduct. Mr. Philippon put up an experimental plant of this kind in a small foundry at Saint-Etienne, France, and this was followed by a larger plant installed in a scrap dealer's yard in southern France.

Immediately after the war all foundries were faced with shortage of pig iron, since blast furnaces were used to make steelmaking iron in preference to foundry iron. Compagnie Generale des Conduites d'Eau knew of the Philippon plants and thought that if these, when operated by non-foundry technicians, could produce so-called "wild" iron, then the plant was susceptible to improvement and modification to give a proper industrial foundry production, and to solve the problem of commercially producing foundry iron which could be cast direct from a steel scrap charge. The iron to be made was for making centrifugally cast iron pipe by the de Lavaud process without any heat treatment before use.

After many months of adjustment and perfecting, the operation of the plant installed at Liege, which has a capacity of about 5 tons per hour, became an industrial proposition. For more than a year, with a melting unit having a diameter of 850 mm

(*Continued on page* 174)

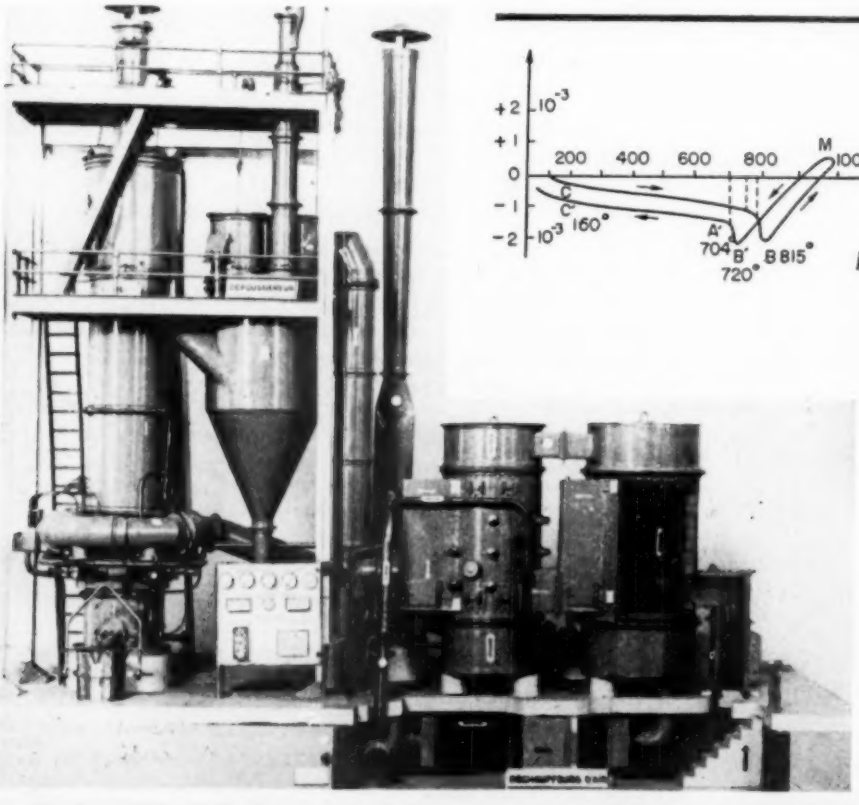


Fig. 1 — Model of metallurgical blast unit showing from left to right cupola, dust catcher, downcomer pipe and heat exchanger units

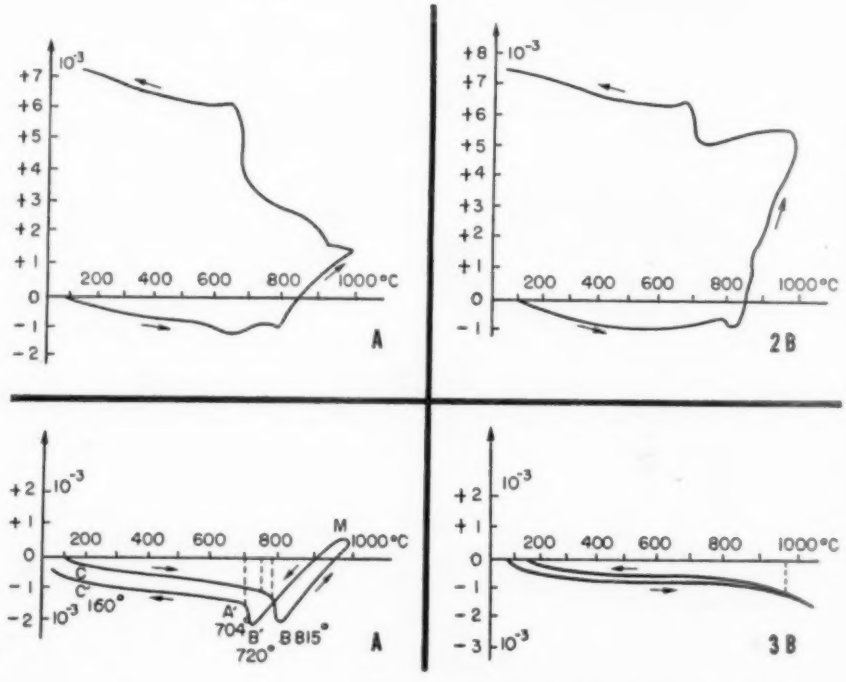
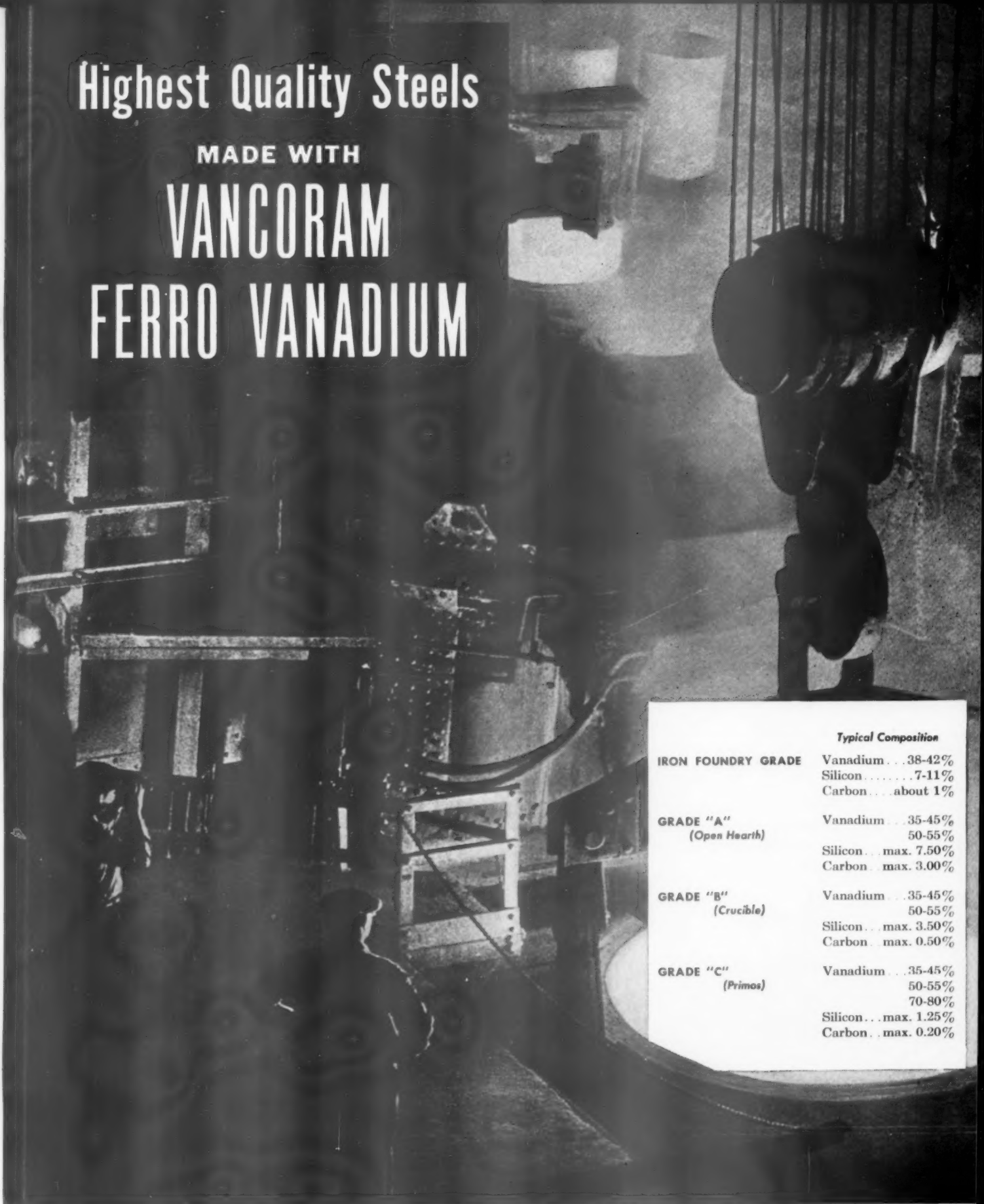


Fig. 2—Growth tests on hematite (low phosphorus) cast iron; (a) First heating to 1000°C shows growth of 0.007 mm and, (b) second heating to 1000°C shows growth of 0.0075 mm

Fig. 3—Growth tests on metallurgical blast cupola iron; (a) First heating to 1000°C shows slight contraction of 0.0005 mm while, (b) second heating to 1000°C indicates nil expansion



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GRADE "B" *(Crucible)*	Vanadium . . . 35-45% 50-55% Silicon . . . max. 3.50% Carbon . . max. 0.50%
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(*Continued from page* 172)

(33.5 in.) between tuyeres, the output of iron for pipe was 1200 metric tons per month average.

A model of the plant is shown in Fig. 1. Its characteristics are as follows: The cupola is cooled externally by running water and the tuyeres also are water-cooled. The charging door is closed and about 35 per cent of the gas is passed to the blast heaters; the remainder is available for various requirements in the foundry. The blast is heated by passing through three clusters of tubes heated externally by the stack gases. A dust catcher placed between the cupola and the recuperator retains the larger impurities.

This plant permits production of metals which have very different properties from those of the materials charged, as the latter undergo marked physico-chemical changes. These are due to the following factors:

Has Reducing Atmosphere

The melting zone, confined to a short distance above the tuyeres, constitutes a reducing atmosphere and operates at a very high temperature. The metallic charges reach this zone at a relatively low temperature, are rapidly melted, pass through the reducing zone at a high temperature, and then through a deep and hot slag.

A second important feature is that only the materials charged enter the slag. In a normal cupola the slag reacts but little because of its relatively low temperature. Furthermore, in the new plant, slag dilution by the wall lining does not exist, since the refractory hardly wears. The high temperature attained permits production of certain slags of high melting point which, in a normal cupola, would cause difficulties, such as bridging, etc.

The features referred to previously clearly indicate that with this plant it is possible to undertake metallurgical operations which will finally give any particular iron whose composition is compatible with the slag it passes through according to the laws of chemical equilibrium.

Owing to the reducing atmosphere in the furnace, there are no metallic losses. Careful analyses show that in the slag there is less iron and manganese than is introduced in the coke ash. The problem of silicon loss is a little more complex and will be referred to later.

The iron is obtained at such a high temperature (above 2732° F) that it is possible to produce easily from a single mix a series of special irons by appropriate inoculations made at the spout of the cupola or even in a

mixing ladle under the cupola spout.

The following advantages relate more particularly to the economies of the process: Low quality coke can be used—that is, high ash or other types—and oxidized metallic materials can be used.

Monthly production capacity is high as no repairs are needed.

Economy in both raw materials and labor for repair work is a not inconsiderable factor.

Since the reactions take place at a high temperature, they are much more rapid; consequently the melting unit is quite sensitive to operational phases. Homogeneity of the raw materials charged plays an important part, especially nonmetallic materials such as coke ash and limestone. From the economic point of view, it should be pointed out that, while it is possible to do without a man who can block a taphole, it is necessary to have a relatively more competent supervisory staff. The plant is markedly more expensive than an ordinary cupola, and it requires the use of a much more important range of control instruments. Briefly, what usually comes under the term of melting costs is higher than in an ordinary cupola.

Materials Charged and Analyses—Iron ore can only be charged into the cupola after special preparation on which tests are now being carried out, and the cheapest raw material is steel scrap.

Carbon can be charged as coke of any type, alone or with an addition of anthracite. By taking into account such factors as blast temperature, quality and quantity of the fuel, and the quantity and composition of the slag, the carbon content can be controlled at will. It is possible to start off with a charge of 100 per cent steel and produce iron with 4 per cent carbon. On the other hand, it is also possible, by altering the operating conditions, to produce low-carbon irons from an initial charge of high carbons.

Phosphorus can be introduced either as high-phosphorus cast iron scrap or as phosphates, either natural or in the form of basic slag. It passes completely in the iron.

Silicon is usually introduced as ferrosilicon. Sometimes, however, it is cheaper to add it as high-silicon iron scrap and thus reduce the charge of steel scrap.

Usually there is sufficient manganese in the normal charge but, if not, ferromanganese is added.

Sulphur comes from the fuel and the scrap charge; it can easily be reduced by means of a suitable slag.

Using a charge of approximately 170 kg (375 lb.) of coke per metric

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Typical Crucible furnace installation—flexible, adaptable, economical.

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There were many salesmen "working on" Brown, some of them promoting various types of melting equipment. Brown listened attentively to them all—heard their stories through. Always he came back with the same considered answer—"Twice I have been pulled off using Crucible melting; both times it has been costly to my foundry and to my pride. Sure, I am still open to conviction; and maybe some day there will come up a method equal in some phases to Crucible melting. But as for equaling Crucible melting in all phases, as yet there 'ain't no such animal'."

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ton of iron, the production of gas is equal to 100 kg (220 lb) of coke per ton.

It cannot be too strongly stressed that the irons made with the metallurgical blast cupola are totally different from those made by the ordinary cupolas, be they hot or cold blast. The fluidity, or capacity of the metal to fill the mold, is better for any given temperature or composition. Three examples are cited below of the irons made; they are by no means exhaustive.

Iron for Spun Pipe: In normal cupola practice it is impossible to add steel to the charge if annealing of the pipe is to be eliminated. Moreover, it is difficult to use less than 60 per cent of pig iron. The metallurgical blast cupola, for the production of the same class of iron, uses for the charge only steel and iron scrap.

High Strength Cast Iron: Such irons are usually made from charges of the following types: Coke, 15 to 17 per cent; limestone, 5 to 8 per cent; Fe-Si (10 per cent), 15 to 20 per cent, and steel scrap, 80 to 85 per cent. The chemical composition is of this order: TC 2.8 to 3.2 per cent; Si 1.8 to 2.3 per cent; Mn 0.5 to 0.8 per cent; S 0.05 to 0.08 per cent; and P 0.05 to 0.10 per cent.

Mechanical Properties: Shear strength 30 to 40 kg. The brinell hardness generally varies from 190 to 250 according to the carbon and silicon contents. It should be pointed out, in this connection, that the irons are but slightly sensitive to section thickness. In numerous castings, for a hardness of 205 at the center position, a hardness of 200 has been obtained at the periphery. This explains why with a charge of the type referred to previously, it is possible to cast parts of very different cross-sectional thickness, while still maintaining a homogeneous structure.

In unetched specimens very fine and evenly distributed graphite is revealed in metallographic examination. Etching shows a matrix of very fine pearlite. This essentially pearlitic structure is one of the salient characteristics of this type of iron. It confers upon castings outstanding properties and makes them particularly resistant to wear.

Fig. 2 shows growth tests of two successive heatings up to 1000° C (1832° F) of a good quality hematite iron. Fig. 3 shows the results from an iron made in the metallurgical blast cupola and similarly treated. The special iron was made from 100 per cent steel scrap and ferrosilicon, with 0.8 per cent Cr added in the ladle. This can be used at temperatures up to 800° C (1472° F) without risk of serious growth.

IMPROVED MOLDING SAND

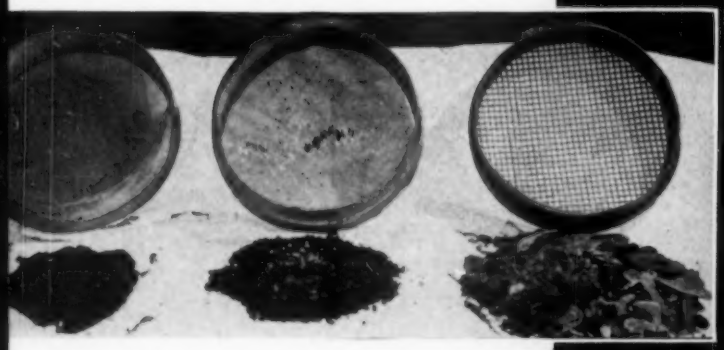
Effected by New Conditioner

IMPORTANCE of proper conditioning of molding sand in eliminating casting defects is indicated by experience of the Zenith Foundry Co., West Allis, Wis. This gray iron foundry prepares its sand at night, cutting 14 floors each approximately 30 ft long by 5 ft wide at the base. After the castings are removed the sand is wetted down. It is then heaped into windrows and bentonite bond and new sand thrown over the heaps.

After the sand is ready for conditioning it is processed by a recently acquired Sandmaster unit, furnished by the American Wheelabrator & Equipment Corp., Mishawaka, Ind. This unit travels the length of each pile, the sand passing over both a magnetic separator and screen before being thrown into a windrow in a fluffy and aerated condition. At the end of the pile the machine is run forward, with the sand being thrown backward.

The first night this unit was operated, approximately 150 pounds of tramp iron of various sizes were removed from only one pile. In subsequent tests one pile gave up 46½ pounds of tramp metal after two days molding. The latter collection, hand screened to indicate the range in size of individual pieces, is shown in the accompanying illustration. Nonmetallic partieles, including coke, charcoal, cores etc., are removed by the screening action of the sand conditioning unit.

The company credits this elimination of foreign material from the sand with effecting a considerable reduction in scrap castings, while the mixing and mulling action of the machine is said to provide a quality of sand which is reflected in fewer casting defects and improved surface finish. In addition, a 50 per cent reduction in bond addition has been made possible.



Right — Sand conditioning machine in operation at Zenith Foundry Co., Milwaukee. *Below* —This tramp iron, weighing 46½ pounds, was removed from one pile of sand after two days' molding

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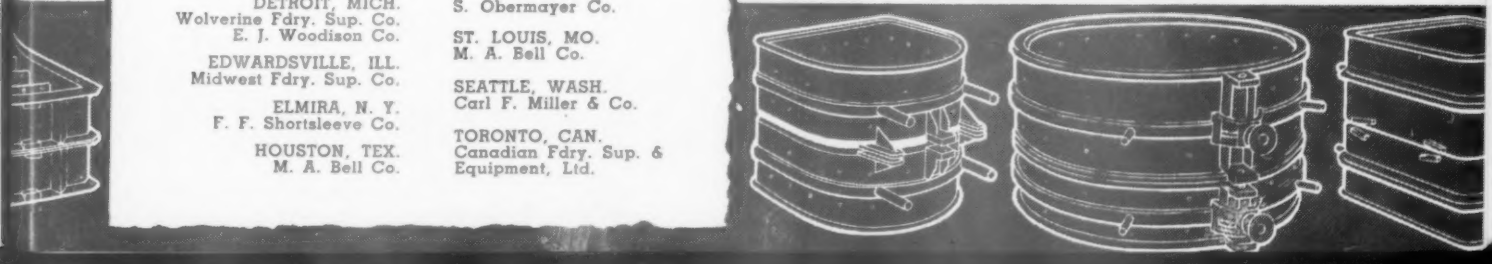

Activities of Foundry GROUPS

Chicago

FOR the opening meeting of its 1950-51 program, Oct. 2, Chicago Chapter of the AFS squared off on a three-way discussion of "Air Pollution Problems Faced by Chicago Foundrymen."

Chester V. Nass, vice president, Pettibone Mulliken Corp., who recently succeeded to the presidency of the chapter following the death of Alfred W. Gregg, consulting engineer, Whiting Corp., Harvey, Ill., presided at the business portion of the meeting. He paid a deserved tribute to Mr. Gregg, who had been elected chapter president just a month before his death, for his long and tireless service to the chapter, the national society and the foundry industry and regretted his untimely passing which denied the chapter his leadership. Mr. Nass then called upon Fred B. Skeates, foundry superintendent, Link-Belt Co., to present a resolution which the directors had adopted on Mr. Gregg's death, a copy to be incorporated in the chapter proceedings and a copy to be sent to Mr. Gregg's family.

Mr. Nass announced that returns from a recent questionnaire indicated sufficient interest in a Foundry Sand Control School conducted by H. W. Dietert Co., Detroit, for the chapter to sponsor the project. A committee has been named to arrange details. The school will be held on four successive evenings at Navy Pier Division, University of Illinois, with dates to be determined.

Walter W. Moore, works manager, Burnside Steel Foundry Co., new chapter vice president and chairman of the program committee, presided over the air pollution session. What is being done about air pollution problems by other Chicago industries was covered in a paper prepared by Vernon G. Leach, consulting engineer and director of research, Peabody Coal Co., Chicago, and chairman of the Cleaner Air Committee, Chicago Association of Commerce and Industry. The paper was read by Guenther Baumgart, secretary of the committee.

Second phase of the problem, "What the Public Expects of You," was handled by Frank A. Chambers, inspector in charge, Department of Smoke Abatement and Inspection, City of Chicago. He commended to his audience study of the publication, "Cupola Dust Suppression" prepared by the Gray Iron Founders' Society, Cleveland.

"What Your Plant Can Do About Air Pollution Problems" was discussed by James R. Allan, manager, industrial engineering and construction department, International Harvester Co., and chairman of foundry executives subcommittee, Cleaner Air Committee.

The chapter's Nov. 6 meeting at the Chicago Bar Association will feature roundtable discussions.—*Erle F. Ross.*

Pittsburgh

INITIAL meeting of the Pittsburgh Foundrymen's Association for the 1950-51 season was held at Fort Pitt Hotel, Sept. 18. H. B. Reed, Westinghouse Air Brake Co., was installed as the new president, O. Edwin Decker, Acheson Mfg. Co., as vice president, and E. P. Buchanan, Pittsburgh Coke & Chemical Co., secretary-treasurer.

Bonding action of clay in molding sand mixtures was discussed by Dr. Douglas C. Williams, associate pro-

(*Continued on page* 180)

CHICAGO: Program committee of Chicago Chapter of the AFS met Sept. 11 to plan events for the current year. Seated, left to right, are: E. E. Henry, Hammond Brass Works, Hammond, Ind.; Walter A. Balton, Link-Belt Co.; H. K. Swanson, Swanson Pattern & Model Works, East Chicago, Ind.; B. C. Yearley, National Malleable & Steel Castings Co.; H. G. Haines, Howard Foundry Co., and Roy W. Schroeder, Navy Pier Branch, University of Illinois. Standing, left to right, are: Deming H. Lucas, manufacturers' representative; Robert E. Kennedy, Navy Pier Branch, University of Illinois; Robert Hendry, Love Bros. Inc., Aurora, Ill.; Chester V. Nass, Beardsley & Piper Division, Pettibone Mulliken Corp., chapter president; W. W. Moore, Burnside Steel Foundry Co., chapter vice president and program committee chairman; T. J. Moore, Wells Mfg. Co., chapter treasurer, and George J. Biddle, Illinois Clay Products Co., chapter secretary. Photo by I. H. Dennen, Beardsley & Piper Division, Pettibone Mulliken Corp.

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(*Continued from page* 178)

fessor, Department of Industrial Engineering, Ohio State University, Columbus, O. Dr. Williams stated that the individual components of naturally bonded and synthetic sand mixtures are similar and must be considered separately when studying bonding action. The quartz form of silica composes the greatest single item of sand mixtures. Each quartz particle of sand or silt possesses a residual negative electrical charge which contributes to the bonding action of clay-minerals.

Because water is a polar material, it will envelop the sand grains in layers, each one molecule in thickness. Layers of water molecules further from the sand grains are not held in place by as great a force as those adjacent to the grains. Angular sand grains seem to be able to possess greater charges and therefore surround themselves with more layers of water.

Clay-minerals such as kaolinite found in naturally bonded sands and added as fire clay to compounded mixtures as well as the montmorillonite clays (western and southern bentonite) are particles which possess residual negative charges in a manner similar to quartz sand grains. Calcination of the clay-mineral by heat eliminates the negative charge and the clay becomes nonbonding and inert.

It was suggested that sand mixtures be made in the following manner to utilize materials in the most economical way. First mix all the sand and water, then add the clay-mineral and mix, and finally add the remaining ingredients and complete the mixing for the best bonding action.—*J. C. Sullivan*

WISCONSIN Chapter of the AFS held its annual golf outing and dinner at Ozaukee Country Club, July 21, with over 700 present. Top view shows the outing committee. In lower view, left to right, are: J. A. Gitzen, Delta Oil Products Co., Milwaukee; J. G. Risney, Risney Foundry Equipment Co., Milwaukee, and August Vierthaler, Iroquois Foundry Co., Racine, Wis. Photos are by Walter V. Napp, Badger Firebrick & Supply Co.

Central Pennsylvania

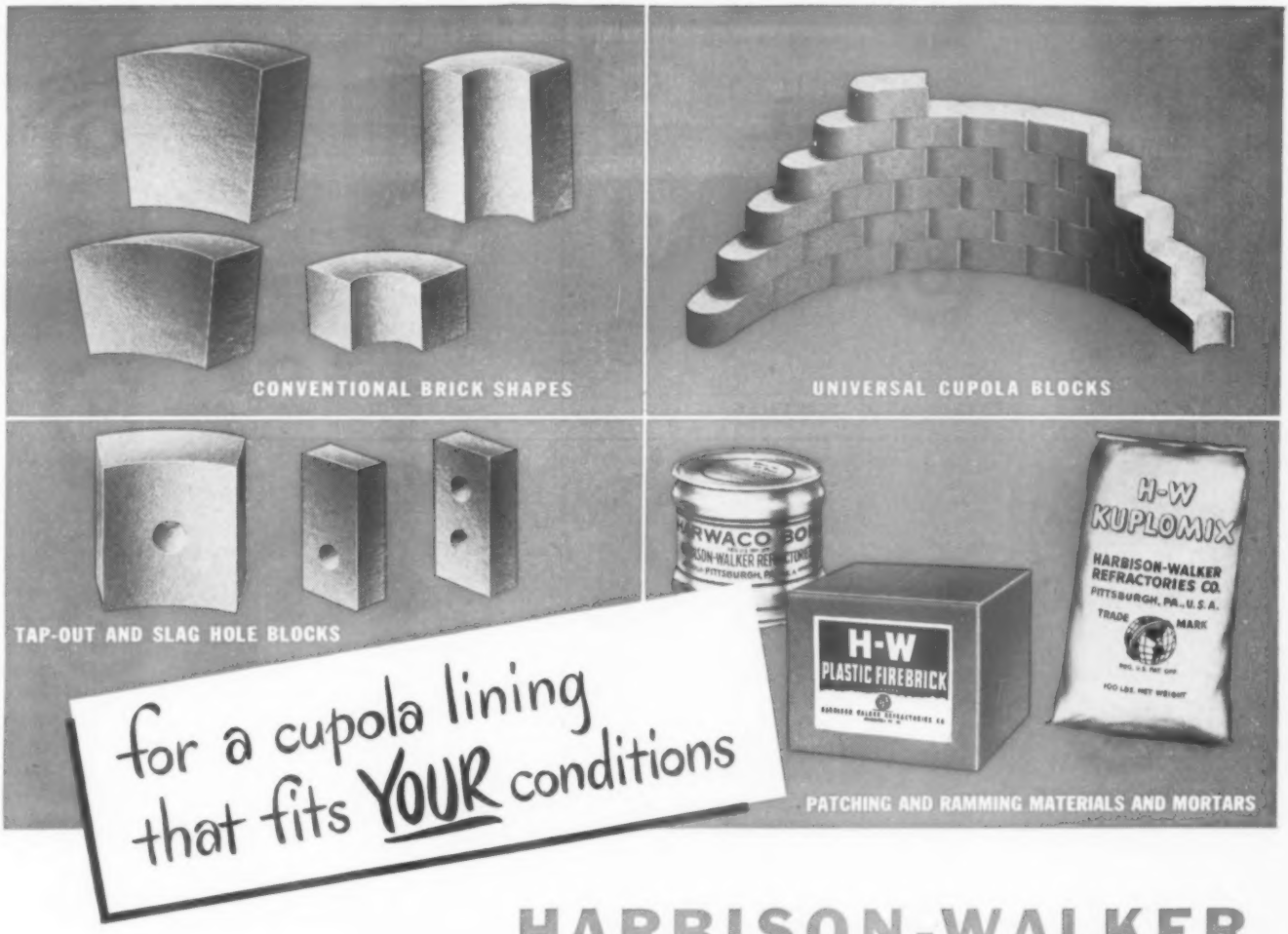
CENTRAL Pennsylvania Foundrymen's Group held it first meeting of the 1950-51 season on Sept. 28 at the School of Mineral Industries, Pennsylvania State College, State College, Pa. Some 30 people turned out to hear Adam Mahonske of the Semet-Solvay Co. speak on the subject of cupola operation.

Mr. Mahonske chose to cover the little details of cupola operation which might make or break the operation. He spoke at some length concerning points common to all cupolas, including patching, bed preparation, removal of fines from fuel, accurate weighing of all materials, proper distribution of charge, bottom preparation, avoidance of packing the charge, and minimizing coke breakage. The speaker then turned his attention to details involved in individual cupolas, and discussed such items as size of coke and iron charges, bed height and air requirements.

A very interesting question and an-

(*Continued on page* 182)

Additional photos of Wisconsin Chapter outing by Clyde Ethier, Pendergast Sand Co.



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TRI-STATE Chapter of the AFS met at Tulsa, Okla., Sept. 15. Shown left to right are: J. A. Dean, Nelson Electric Mfg. Co., Tulsa, chapter treasurer; Tom Barlow, Eastern Clay Products Inc., Jackson, O., speaker; C. C. Beagle, Webb Corp., Webb City, Mo., chapter secretary, and R. W. Trimble, Bethlehem Supply Co., Tulsa. Photo by F. E. Fogg, Acme Foundry & Machine Co.

(*Continued from page* 180)
swer period followed in which the audience indicated interest in certain operation features recommended by the speaker concerning bed preparation and the use of kindling tuyeres.—*R. W. Lindsay, Pennsylvania State College*

Central New York

CENTRAL New York Chapter of the AFS met Sept. 8 at Twin Ponds Country Club, Utica, N. Y. Sixty-five members and guests attended to hear W. A. Hambley, Wilson Foundry & Machine Co., Pontiac, Mich., discuss "Casting Defects." Mr. Hambley opened with a discussion of the foundry industry in general and its position in the engineering world today. He also complimented the industry as a whole on the manner in which individual foundries are exchanging information and ideas for the advancement of foundry practices.

The speaker then presented a large collection of slides showing typical casting defects with suggestions and remedies. Included was a table giving ten contributing factors to casting defects. Mr. Hambley emphasized that foundrymen who are confronted with a particular problem should first establish the fundamental cause of the defect. In conclusion he suggested that members would benefit greatly by bringing their problems up for discussion at the meetings of their local chapters.—*James O. Ogden, Cleveland Tramrail Syracuse Co.*

WESTERN MICHIGAN Chapter of the AFS held its annual stag picnic Aug. 19 at Pontaluna Golf Club, Muskegon, Mich. Views of the affair are shown above

Tri-State

SEPTEMBER meeting of Tri-State Chapter of the AFS was held at Michaelis Cafeteria, Tulsa, Okla., with Tom Barlow of Eastern Clay Products Inc., Jackson, O., as guest speaker. Leading a discussion entitled, "Let's Kick it Around," Mr. Barlow gave considerable attention to sands, metals and general processes. —*D. W. Harris, Frank Wheatley Pump & Valve Manufacturer*

Western Michigan

MORE than 850 foundrymen and their guests attended the tenth annual stag picnic of Western Michigan Chapter of the AFS held at Pontaluna Golf Club, Muskegon, Mich., on Aug. 19. In addition to golf the entertainment included horseshoes, baseball, beno, a turkey race, a greased pig race and a good floor show. Many door prizes were distributed throughout the day. A barbecue with all the trimmings was served.—*C. H. Cousineau, West Michigan Steel Foundry Co.*

Cleveland Non-Ferrous

CLEVELAND Chapter of the Non-Ferrous Founders' Society opened the current season with a clambake at Bessie Miller's Broadview Club, Cleveland, Oct. 4 with 38 present. The meeting was entirely social.

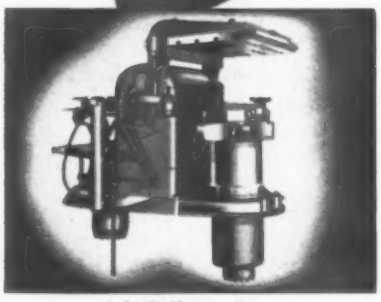
Chapter officers are: W. S. Beckenbach, Proof Machine & Brass Foundry Co., chairman; R. T. Maneely, Hoffman Bronze & Aluminum Casting Co., assistant chairman; D. B. Kennedy, Gluntz Brass & Aluminum Foundry Co., secretary, and E. J. Metzger, Wellman Bronze & Aluminum Co., treasurer. All are in Cleveland.

Central Illinois

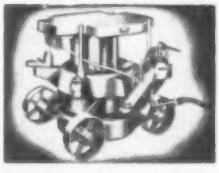
APPROXIMATELY 100 members and guests attended the first fall meeting of Central Illinois Chapter of the AFS, held Oct. 2 at the American Legion Hall, Peoria, Ill. Thirty new members were reported by the membership committee. Chapter Chairman C. W. Russell announced that the chapter officers and directors had unanimously voted to contribute $1000 to the fund to provide a permanent headquarters building

(*Continued on page* 184)

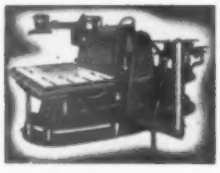
If you work with Sand?



Jolt Rollover Draw
Model A



Jolt Pin Lift
Model AJS (Portable)



Jolt Rollover Draw
Model SA

Jolt Squeeze
Model 10-JX (Stationary)

Plain Jolt
Model AJ-16

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Davenport MOLDING MACHINES

In a production foundry or a job shop you can save man-hours, produce better uniform castings and lower your costs with Davenport Foundry molding machines.

Davenport molding machines are made in all sizes to meet your individual requirements.

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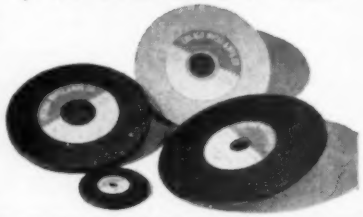

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Foundries doing precision investment casting work look to Chicago Wheel for every requirement in abrasive mounted wheels, cut-off wheels and grinding wheels. You'll find them available in a wide range of shapes, sizes and specifications . . . backed by years of experience in de-burring precision castings.

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For your cleaning and burring operations, look to Chicago Wheel—first and finest in mounted wheels and cones, both Vitrified and Resinoid. Here you get a custom-built product, including every grain, grade and shape of specified structural density to fulfill the most exacting requirements. Keep production up, costs down . . . with Chicago Wheels.

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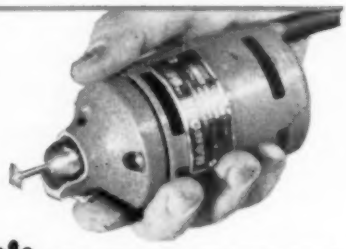

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(*Continued from page* 182)

for the AFS National Office.

An interesting talk was presented by W. H. Franklin, controller, Caterpillar Tractor Co., Peoria, Ill. In his discussion of "What Makes Business Tick," Mr. Franklin pointed out that profits from many businesses are in direct relation to sales. Likewise, since sales are related to the quality and service of product, he urged foundrymen to strive for production of saleable quality castings.

The Peoria Association of Commerce has requested the chapter to prepare

CENTRAL ILLINOIS Chapter of the AFS heard W. Franklin, controller, Caterpillar Tractor Co., Peoria, Ill., speak at its first meeting

a mobile display showing the evolution of castings from blueprint to finshed product, for use in the educational program of Peoria schools.—*Robert J. Paluska, Caterpillar Tractor Co.*

Birmingham

SEVENTEENTH annual outing and barbecue of Birmingham District Chapter of the AFS was held at Cascade Plunge Sept. 16. The committee in charge of arrangements included: E. A. Brandler, Electro Metallurgical Division, Union Carbide & Carbon Corp., chairman; Eugene Whelchel, American Cast Iron Pipe Co.; Lipscomb Carl, Sloss-Sheffield Steel & Iron Co.; William J. Bach, Foundry Service Co.

At a meeting of the officers and directors ten days before the outing, Chapter Chairman Morris L. Hawkins, Stockham Valves & Fittings, appointed the following members to serve on the educational committee: Ray Farabee, Central Foundry, Holt, Ala., chairman; C. P. Caldwell, Caldwell Foundry & Machine Co.; T. H. Benners, T. H. Benners & Co.; L. N. Shannon, Stockham Valves & Fit-

(*Continued on page* 187)

THE MOST SATISFACTORY WAY TO SOLVE YOUR FOUNDRY PROBLEMS

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Universal Castings Corporation, Chicago, Ill.
Massey-Harris Co., Racine, Wis.
Appleton Electric Company, South Milwaukee, Wis.
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KNIGHT Services For Foundries:

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MORE AND MORE foundries are discovering an ideal solution to their problems in production, methods, layout, facilities, equipment and labor to insure an adequate profit pattern. It is a simple, logical solution: using experienced professional Knight Foundry Engineers to supplement your foundry staff *temporarily*—until the problems involved are ironed out satisfactorily. This combination of your detailed knowledge of your special requirements plus the broad experience of the Knight organization proves outstandingly successful to reduce unit costs.

Knight Engineers have had many years of successful experience in foundry management, production, engineering or equipment. They have worked in or with foundries of all types and sizes and know the "how and why" of successful foundry operation.

Knight has a complete foundry service and can be of valuable help to you on any problem, large or small. Call the Chicago or New York Knight office for immediate attention.

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When you buy shot and grit, you buy a promise of uniform, low cost, efficient blast cleaning or peening. Your confidence in the material ordered should be based on actual use, rather than recommendation or reputation. Its true value to you can only be determined by a thorough test in your equipment, on your job.

To all outward appearances, most shot and grit may appear to be the same—but, that's where the similarity ends. Where Hi-Grade Shot and Grit are concerned, you'll find there IS a difference . . . a value far beyond purchase price that pays out in extra performance on *your* job. Hi-Grade Shot and Grit is *quality-controlled* from molten metal to finished product. Order a trial quantity today. Let results convince you *Hi-Grade is best by test.* That's the only practical and profitable way to buy abrasives.

PACKED IN 100 LB. BAGS
READY FOR IMMEDIATE SHIPMENT

HI-GRADE SHOT
UNIFORM SIZE AND HARDNESS

Withstands repeated strain, stress and wear. Famous for its lack of hollows, tails, irregular shapes. Exclusive alloying and tempering process helps prevent rust; minimizes impact fractures.

MORE THAN MEETS S.A.E. SPECIFICATIONS
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SHARP, TOUGH AND DURABLE

Made of same material and processed by same methods as Hi-Grade Shot. Free from dust fines and scale. Cleans with maximum efficiency. Easy on equipment—reduces wear and maintenance costs.

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MANUFACTURERS OF *QUALITY-CONTROLLED* SHOT AND GRIT

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(*Continued from page* 184)

tings. Mr. Shannon, a past president of the American Foundrymen's Society, also will serve as adviser to the AFS student chapter now being organized at the University of Alabama.

Charles K. Donoho, vice chairman, announced that F. W. Less will speak on the Croning process of molding at the chapter's Nov. 17 meeting and at the Jan. 19 meeting the speaker will be R. A. Flinn, American Brake Shoe Co. Mr. Donoho also advised that plans are going forward on the program of the chapter's regional conference to be held in February, 1951.—*J. P. McClendon, Stockham Valves & Fittings*

Eastern New York

A PLANT inspection of the General Electric Company's steel and iron foundries as well as a trip through the pattern shop and new turbine building was arranged for the Sept. 19 meeting of Eastern New York Chapter of the AFS. E. S. Lawrence of the company's iron foundry engineering staff and A. J. Kiessler of its steel foundry engineering staff led the groups and explained the various operations. Among the most interesting subjects was the pouring of a 35-ton cast iron turbine shell and the special coring operation. Also of interest were the new 17-ton per hour electric melting furnace in the steel foundry, the shakeout, hydraulic cleaning unit and sand reclamation equipment.

The technical session was held at Circle Inn, Lathams, N. Y. with both Mr. Lawrence and Mr. Kiessler discussing further the operation of their respective foundries.—*George E. Danner, American Locomotive Co.*

EASTERN NEW YORK Chapter of the AFS met at the Circle Inn, Lathams, N. Y., Sept. 19. Shown at left above, left to right, are: George Cameron, pattern-making foreman, and Guy Haines, foundry superintendent, Sheridan Iron Works, Champlain, N. Y. At right is E. S. Lawrence, foundry engineering staff, General Electric Co., Schenectady, N. Y., one of the speakers at the meeting

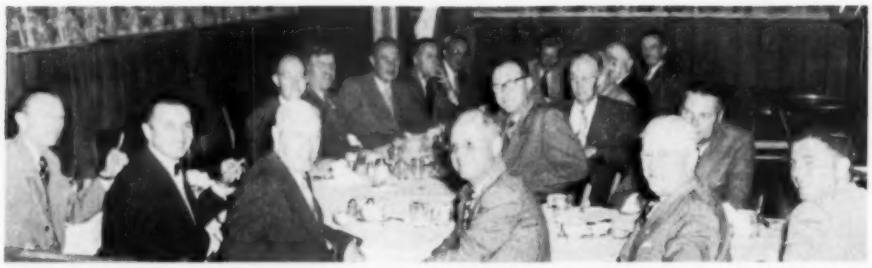
Quad City

MORE than 100 members were present for the opening meeting of Quad City Chapter of the AFS. Elmer Zirzow, material engineering department, Deere & Co., Moline, Ill., and a member of the chapter, spoke on "Molding and Core Sand Mixes."

Mr. Zirzow contended that many modern mechanized foundries test and record sand checks and yet do not act upon that information. In comparing local sands with the St. Peters sand stone of Ottawa, Mr. Zirzow presented slides which indicated the Ottawa sand has a near round grain whereas the local sand grains showed sub-angular grain structure. In the past it was thought a one pan sand was desirable since it offers the best permeability and maximum green strength. However, Mr. Zirzow pointed out the trend now is toward distribution over many pans. This is accomplished through blending either at the quarry or when introducing new sand into the system.

Several points stressed by the speaker deserve further consideration: A smooth surfaced casting can only be obtained by using a base sand

CHICAGO Chapter of the AFS held its annual outing Aug. 12 at Lincolnshire Country Club, Crete, Ill. Chapter Chairman Chester V. Nass, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago, is shown at lower row, center, addressing chapter members and guests who attended the outing



NORTHERN CALIFORNIA: Foundry executives in the northern California area honored Walton L. Woody, vice president in charge of operations, National Malleable & Steel Castings Co., Cleveland, and national AFS president, at a dinner in Oakland, Calif., recently. Second from left is John R. Russo, Russo Foundry Equipment Co., Oakland, and president, Northern California Chapter of the AFS; Mr. Woody is third from left, and at his right is Philip C. Rodger, General Metals Corp., Oakland, chapter vice president and program chairman

with a high AFS number; moisture causes more scrap than any other constituent in the sand even though it is the cheapest part of the mix. —*R. E. Miller, John Deere Planter Works*

New Jersey

NEW Jersey Foundrymen's Association, at its first fall meeting, Sept. 18 in Newark, amended its bylaws to reduce the number of directors from 18 to 12 over a period of three years. Also it elected three directors: W. Z. Taylor, of Taylor & Co. Inc., Brooklyn; A. M. Pullow, Worthington Pump & Machinery Corp., Harrison; and A. G. White, White Foundry Co. Inc., Jersey City. Max Traum, Sacks-Barlow Foundries Inc., Newark, was chairman of the nominating committee.

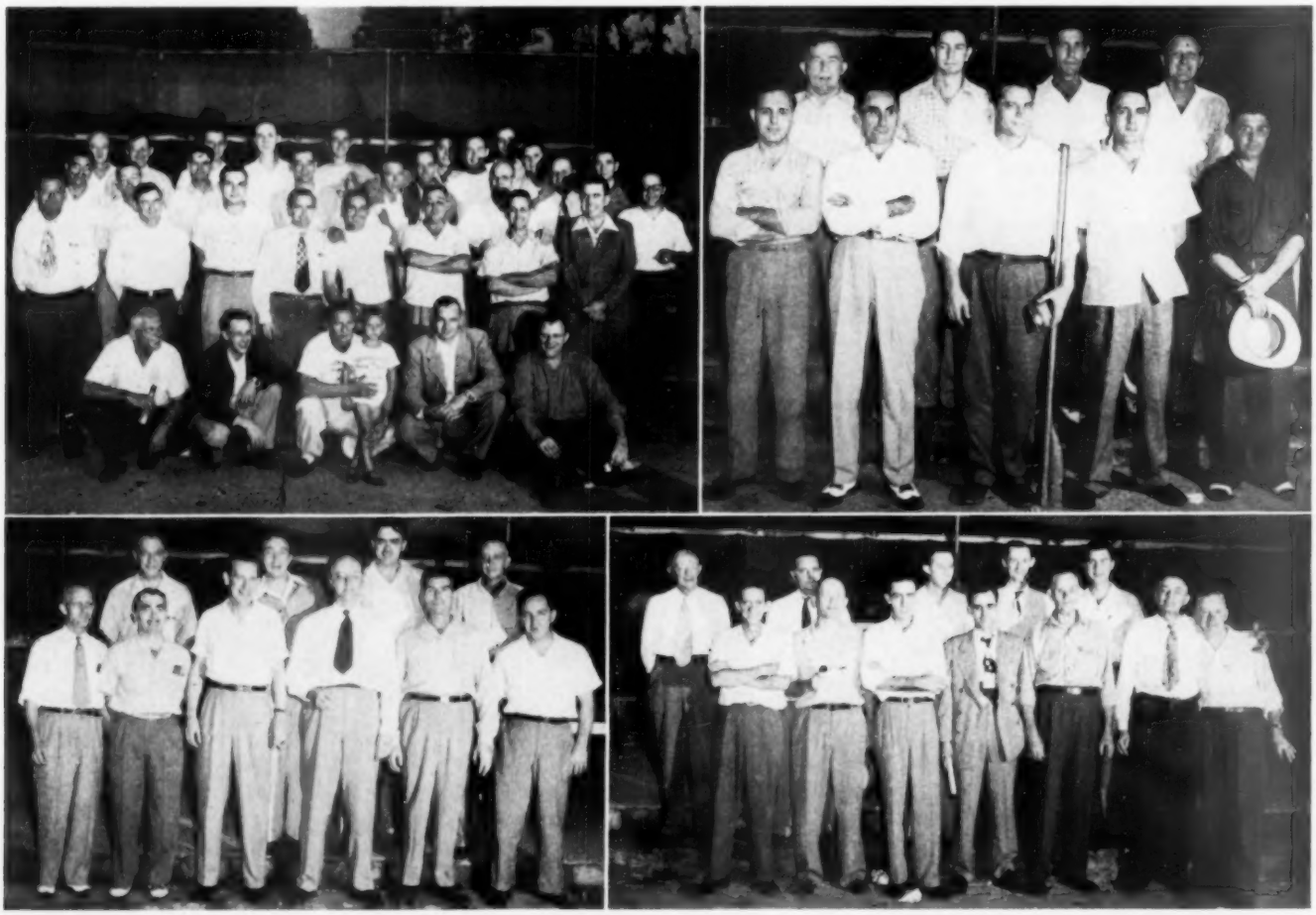
An interesting feature was an address by M. M. Ruby, director of sales, Sacks-Barlow Foundries Inc., on "Korea and the Korean War Situation." Mr. Ruby was formerly assistant provincial governor, Kangwon Province, South Korea, following service in the infantry during the last war as major. He filled in much background on current news reports from Korea and gave a colorful description of his many dealings with the Russians.

Several informal talks were presented on problems likely to arise under a wartime economy, including allocations and other government controls and possible shortages of pig iron, coke, scrap and manpower. Speakers included J. A. Claussen, American Iron and Steel Institute, and Niles Anderson Jr., Debevoise-Anderson Co., both of New York.—*Ben K. Price.*

Tennessee

ANNUAL barbecue of Tennessee Chapter of the AFS was held at Signal Mountain Golf and Country Club Aug. 26. The 400 members and guests entertained themselves by playing golf, horseshoes, swimming, darts and badminton and those who did not participate enjoyed meeting and talking with old friends. A special feature was furnished by Bob Hise, who, with his small son, gave a tumbling and balancing demonstration.

(*Continued on page* 190)



TENNESSEE Chapter of the AFS held its annual barbecue at Signal Mountain Golf and Country Club Aug. 26

Tenth in a series of Unusual Grinding Operations

Army Lifts Veil of Secrecy at Malta, Bares Rocket Progress
Adequate Defense Of U. S. Assured, Say Experts
By CON HEFFERNAN
Times-Union City Editor
Trip to Moon Now 'Feasible' But Not Yet Probable

BAYFLEX® SCORES ANOTHER HIT!

Grinding welds on rockets may not be your particular problem but if you BLEND WELDS . . . REMOVE RUST AND SCALE . . . or have PORTABLE CUT-OFF problems, Bayflex Disc-Wheels are the answer. They are fast, safe, economical, easy on the operator (cushioned grinding action). The side as well as edge is used. They fit all standard right angle portable grinders and sanders.

The problem of grinding welds on rockets was solved by these resilient abrasive disc-wheels.

ORDER TODAY FOR A TRIAL.

Sizes available for immediate shipment:

7" x 1/8" x 7/8"	9" x 1/8" x 7/8"
7" x 3/16" x 7/8"	9" x 3/16" x 7/8"
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Grit sizes: 16, 24, 36, 54, 80
(Aluminum Oxide abrasive)

Specify Silicon Carbide abrasive for rust and scale removal. Stocked only in 16 grit, 9" x 1/4" x 7/8" size.

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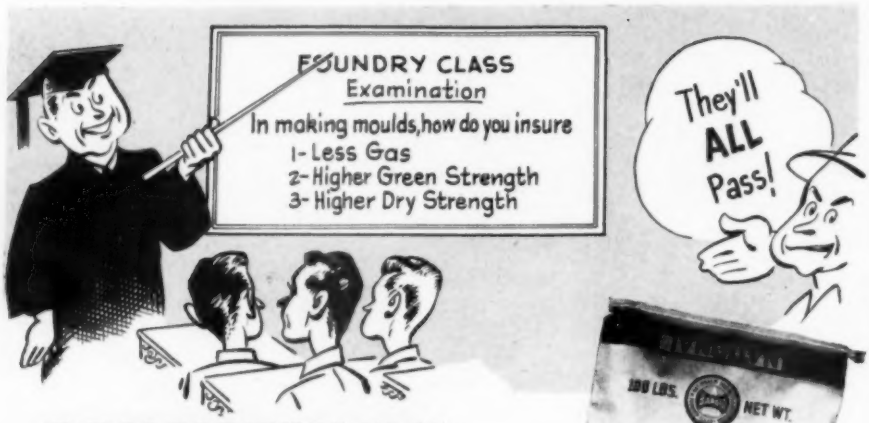
BAY STATE ABRASIVE PRODUCTS CO., Westboro, Mass.

Top Performance Consistently Duplicated



CONSISTENTLY HIGH QUALITY NATIONAL BENTONITE

is the answer—and they know it. National Bentonite's high colloidal property gives good bond with small quantities—makes it economical—lessens danger of blows or gas holes. It gives readily workable sands of much lower moisture content than can ordinarily be used with natural sands or most synthetics, and gives excellent hot strength at 2500° F. Gives finer finish too.

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BAROID
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BENTONITE SALES OFFICE
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CHICAGO 4 • ILLINOIS

(*Continued from page* 188)

Richard Kirchmayer, Sterling Wheelbarrow Co., was general chairman of the committee and was assisted by Burt Mullenix, Fred H. McGee, Herb Dent, Porter Warner Jr., Howard M. Barker, Jim Minter, Vernon Eason, Charles Appel and Carl A. Fischer Jr.—*Carl A. Fischer Jr., Fischer Supply Co.*

Philadelphia

PHILADELPHIA Chapter of the AFS will hold its 1950 Management Dinner, Nov. 21, at the Union League Club, Philadelphia. Management representatives in attendance at the meeting will be addressed by Gen. Donald Armstrong, president, United States Pipe & Foundry Co., East Burlington, N. J., whose subject will be "Company Planning for Industrial Mobilization."

GEN. ARMSTRONG

Prior to joining United States Pipe & Foundry Co. in 1947, Gen. Armstrong was assistant chairman of the executive committee of the American standards Association. He served in the U. S. Army for 37 years, and during World War II was chief of the Chicago Ordnance District and later was commandant, Industrial College of the Armed Forces.—*G. H. Bradshaw, Philadelphia Naval Shipyard.*

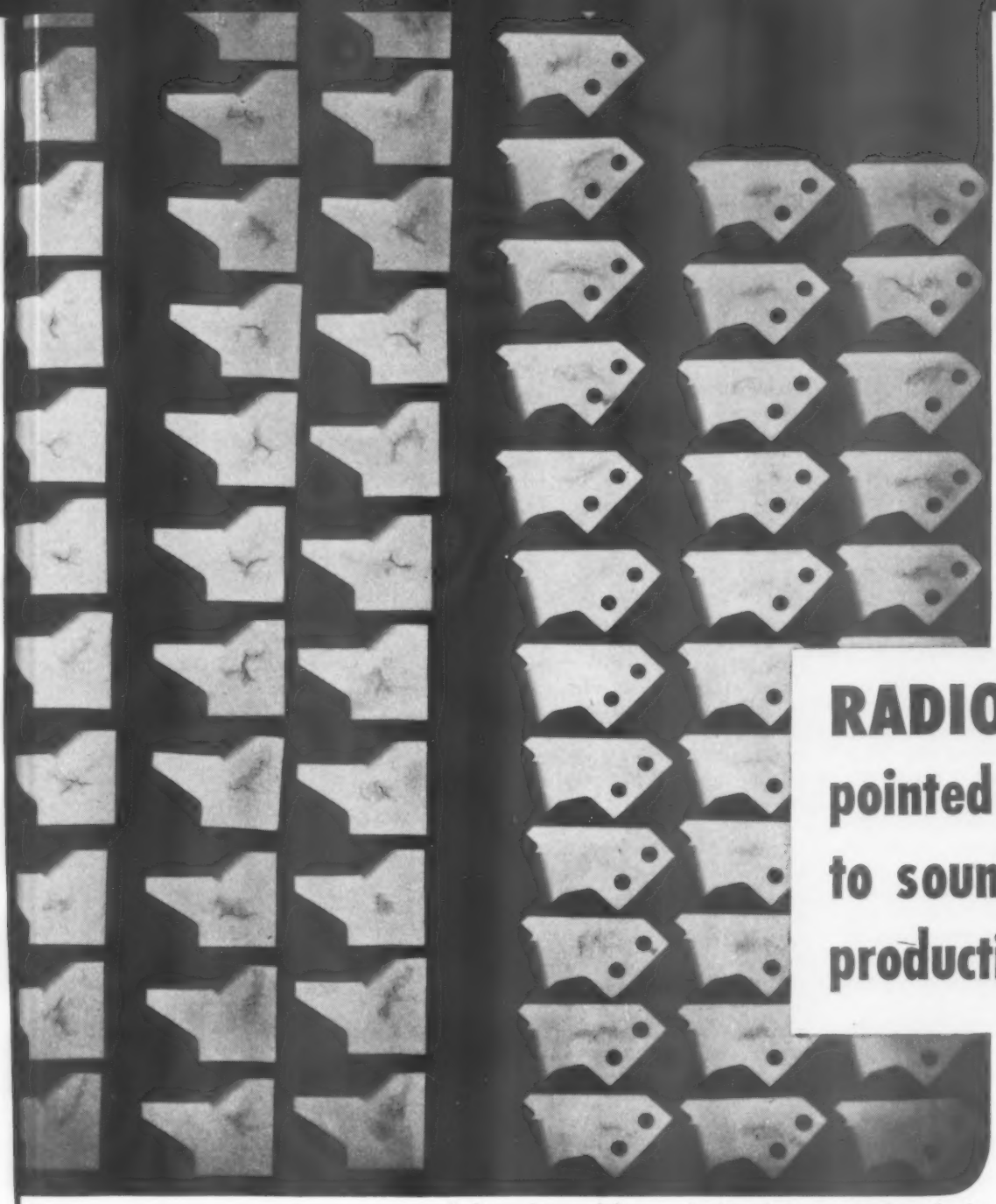
Northeastern Ohio

NORTHEASTERN Ohio Chapter of the AFS opened the current season with a clambake dinner at Tudor Arms Hotel, Cleveland, Sept. 14. Attendance was 176. Principal technical speaker was Clyde A. Sanders, vice president, American Colloid Co., Chicago. He offered "Some Suggestions on Sand and Molding Practice."

Mr. Sanders discussed hot sands and their effect on casting quality. He stated that good foundry practice requires maintenance of a sand supply that is five times the weight of metal tonnage poured daily in the foundry. A smaller ratio produces hot sand and leads to casting trouble. Continuous reuse of sand to obtain a fast turnover (more than three times daily) has the same bad effect.

Mr. Sanders stated that the sand with the greater flowability produced least metal shrinkage and least mold deformation. However, when a finer

(*Continued on page* 192)



RADIOGRAPHY pointed the way to sound production

Radiography revealed a recurring irregularity in a simple production casting—showing the need for a change in casting procedure.

Simple castings are not always soundly made the first try. These were for a customer who had learned to expect highest quality from the foundry.

The first group cast was checked radiographically. Similar irregularities were found in nearly every part, indicating the need for a change in casting procedure. With the help of radiography the change was made with a minimum of lost time, and sound parts were quickly cast and delivered to the customer.

Any foundry that seeks a reputation for producing consistently sound castings will find radiography an invaluable aid. It detects irregularities. It pictures the effects of changes in gating, venting, pouring temperatures, chilling, and other variables. It pays for itself from savings in development time and in reduced rejections—builds customer good will.

Ask your x-ray dealer to explain all the ways radiography can help you increase yield and cut costs, or ask Kodak for a copy of "Radiography as a Foundry Tool."

EASTMAN KODAK COMPANY
X-ray Division
Rochester 4, N. Y.

Radiography . . .

another important function of photography

Kodak
TRADE-MARK

(*Continued from page* 190)
screen sand was added to the mix to obtain better casting finish, more water was necessary to obtain flowability, resulting in casting shrinkage. Best casting finish and least shrinkage were obtained by adding 4 to 5 per cent seacoal or ½ per cent wood flour to the sand mix.

At the patternmaking session under the direction of Peter Rettig, Rettig Pattern Co., Cleveland, a wide range of topics was considered. In the discussion it was pointed out that Peruvian mahogany is somewhat harder than the Honduras type, and preferable for severe usage. Life expectancy of well constructed, steel-faced mahogany patterns was given as at least 500 molds, and cases of 10,000 were cited.

Attention was directed to the necessity of heat treatment of aluminum alloy core driers previous to use to eliminate growth. A triple treatment at 450° F was recommended. On the question of shrinkage allowance on wood masters for aluminum alloy patterns, the consensus was that there is no standard since the intricacy of the form, method of gating, shaking out hot or cold, etc., required variations in shrinkage allowance.

Joint meeting of the foundry and patternmaking division filled the ball room of the Tudor Arms Hotel to capacity at the Oct. 12 meeting of Northeastern Ohio Chapter of the AFS presided over by Fred J. Pfarr, Lake City Malleable Co., Cleveland. Following a brief routine session, including introductions and typical announcement by L. P. Robinson, Werner G. Smith Foundry Sales Division, Archer-Daniels-Midland Co., of several features in connection with the proposed Christmas party Dec. 14 at Hotel Carter, Cleveland, the audience listened with marked appreciation to three speakers. Jimmy Lee, athletic director, Cleveland Athletic Club, presented an interesting and at times humorous running commentary on the 1948 Olympic Games which he attended in London.

During the second feature on the program the audience sat in darkness for 45 minutes while George Zang and E. F. Chittenden, Unitcast Corp., Toledo, O., presented a "Let's Pretend" safety training program. Blindfolded in the dark room, the audience lit cigarets, sprinkled tooth powder on a brush, felt pieces of cloth, tried to read Braille, and in a general way learned of what they would have to do and what to avoid in the event eyesight was lost. The entire presentation was built around the speakers' belief that spasmodic or intermittent efforts to inculcate safety into the minds of people is wasted effort.

Every person carelessly or confidently believes that the accident, light or heavy, might happen to the other fellow, but that he is immune. Since the greater part of the address was centered on accidents in the industrial field, the speaker claimed that those in charge of plants constantly should preach and practice safety. Through the natural perversity of human nature, workmen refuse to be driven along any designated path. On the other hand, they may be led under wise and skilful direction. *—Pat Dwyer, Edwin Bremer, and Robert H. Herrmann*

SOUTHERN CALIFORNIA Chapter of the AFS met Sept. 8 at Rodger Young Auditorium, Los Angeles. Principal speaker was Thomas E. Eagan (left), Cooper-Bessemer Corp, Grove City, Pa. View of speakers' table is shown below. Photos by K. F. Sheckler, Calmo Engineering Co.

Twin City

CASTING Defects" was the topic considered at the opening meeting of Twin City Chapter of the AFS held Sept. 12 at the Covered Wagon, Minneapolis. George Anselman, foundry engineer, Beloit, Wis., was the speaker.

In Mr. Anselman's opinion the foundryman's difficulty with scrap is the result of carelessness more than technical inabilities. He further explained that a good basic concept of gating and risering, sand and metal operation plus good common sense can reduce scrap tremendously. The speaker presented a series of slides showing all the common types of casting defects. With each illustrated defect Mr. Anselman offered an explanation of the causes and possible remedies.—*J. D. Johnson, Archer-Daniels-Midland Co.*

Northern California

THE current season for Northern California Chapter of the AFS opened Sept. 15 with a meeting at Hotel Shattuck, Berkeley, Calif. Chief speaker was Thomas E. Eagan, chief metallurgist, Cooper-Bessemer Corp., Grove City, Pa., whose topic was "Nodular Iron."

Mr. Eagan discussed what has been done with nodular iron to date and what future industrial uses this new product might expect. His talk was illustrated with slides showing comparisons of physical properties of steel, cast iron and nodular iron.

Weldon Russell, Phoenix Iron Works received four tickets to the San Francisco 49'ers football games this year by winning the attendance and door prize drawings.—*J. M. Snyder, Joseph Musto Sons-Keenan Co.*

Southern California

SOUTHERN California Chapter of the AFS held its first meeting of the 1950-51 season at Rodger Young Auditorium, Los Angeles. Featured was Thomas E. Eagan, Cooper-Bessemer Corp., Grove City, Pa., a national director of AFS, who spoke on "Practical Application of Ductile Iron."

Mr. Eagan, chief metallurgist of his organization, emphasized the importance of proving its qualifications to engineers and designers. Successful applications of ductile iron in Cooper-Bessemer products have required new methods for testing structural durability of this material. The speaker pointed out that it has been necessary to compare the properties of ductile

(*Concluded on page* 196)

REDUCE EXHAUST AIR WITH CONTROLLED VENTILATION

Balanced Air Supply Saves Money

Lavish use of exhaust air can be expensive. When excessive volumes are used an unbalanced condition results in the foundry, setting up unwanted air flow patterns and causing waste of needed plant air.

Schneible "Compensating Air" hoods are designed with controls that allow the proper volume of supply air from either inside in summer to remove hot, dead air from under the roof, or outside in winter to conserve wanted power plant heat. Exhaust air volumes are also regulated to maintain building ventilation balance and more efficient use of all air.

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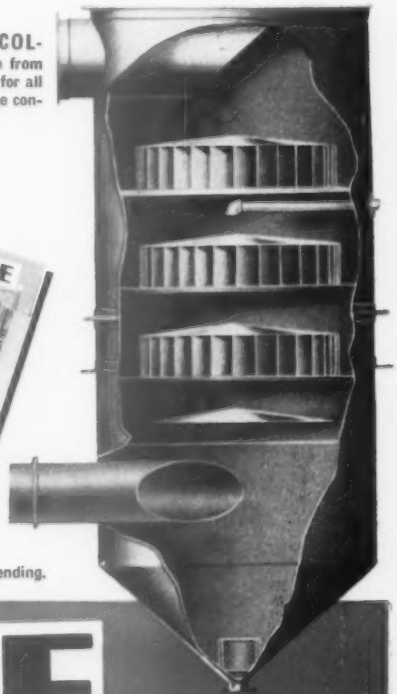
MULTI-WASH COLLECTORS available from 1000 to 36,000 c.f.m. for all dust, fume and smoke control applications.



Free

BULLETIN NO. 450

The latest information on standardized Schneible Uni-flo Hoods for Shakeouts, Pouring Stations and Mold Conveyors is now available for your files.

This comprehensive 16-page two color catalog includes pictures of each type of hood, tells how it functions and its outstanding features.

U. S. and Foreign Patents Pending.

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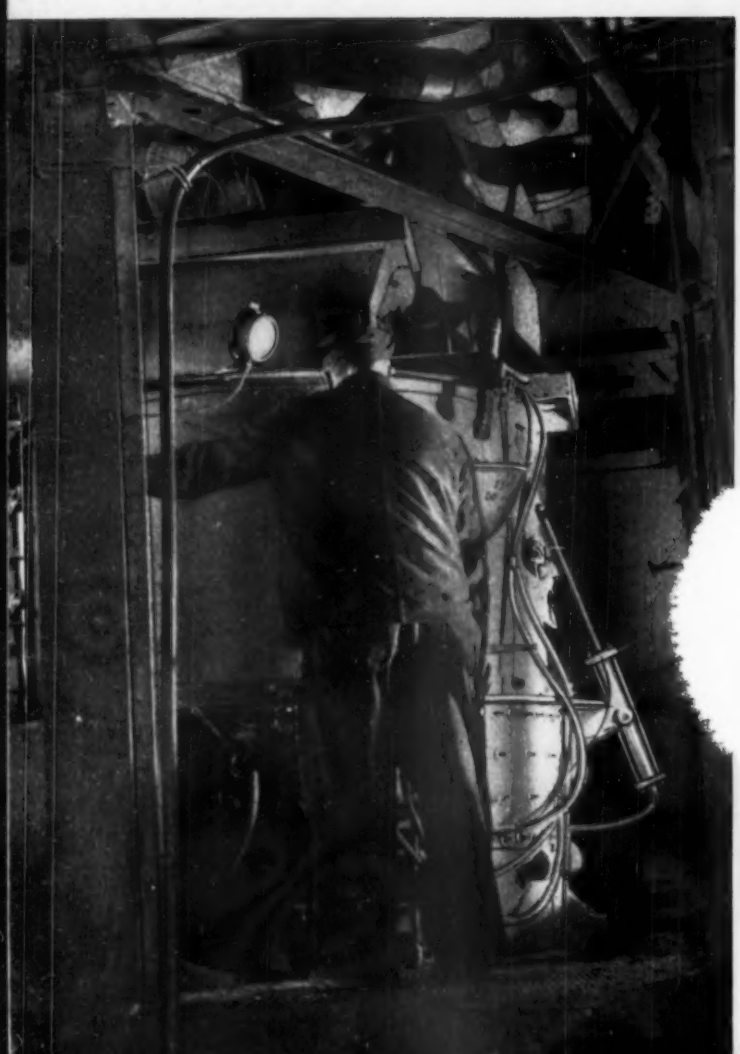
ALLOY CAST STEEL COMPANY...

A JOBBING FOUNDRY ON A PRODUCTION BASIS!



ALLOY'S

SPEEDMULLOR

INCREASES MULLING CAPACITY . . . CUTS MULLING COSTS!

A Model 60 Speedmullor at Alloy Cast Steel Company, Marion, Ohio, prepares all of the molding sand used in the foundry. Sand is loaded, *completely mulled, positively cooled* and discharged in batches of 12 cu. ft. *in total cycles of 90 seconds!*

ALLOY'S SANDSLINGER

EQUIPPED MOLDING LINE

DOUBLES MOLD PRODUCTION . . . REDUCES MOLDING COSTS 70%

A Stationary Sandslinger, supplied with Speedmullor mulled sand from a B&P Plate Feeder, rams molds for castings ranging in weight to 400 lbs., on a "figure nine" loop roller conveyor. Mold production for this class of work has been doubled, and molds from a variety of patterns are actually produced at 70% lower overall cost than by any previous method.

Jobbing Foundries! You need not be penalized because of relatively small runs of castings. Due to Speedmullor and Sandslinger flexibility, jobbing work can easily be put on a production basis . . . with all the benefits of high production operation.

Let us show you how other jobbing foundries are now stepping-up the production of molds made from a large variety of patterns . . . with corresponding reductions in cost per mold. Perhaps your exact production problems have been solved at other foundries. A B&P representative can tell you, and he will arrange for you to see equipment in operation at a neighboring foundry. Write today!

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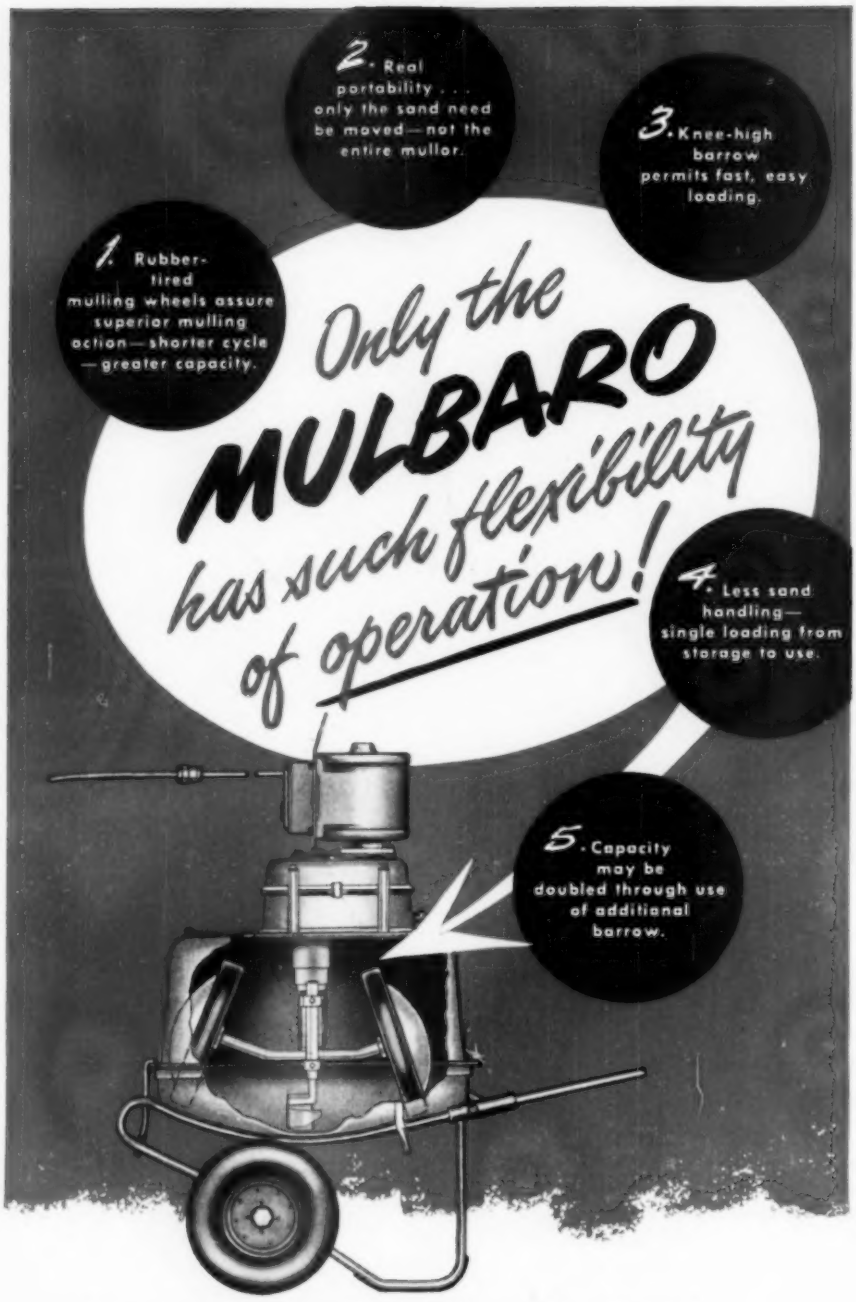
2. Real portability . . . only the sand need be moved—not the entire mullor.
3. Knee-high barrow permits fast, easy loading.
1. Rubber-tired mulling wheels assure superior mulling action—shorter cycle—greater capacity.
Only the MULBARO has such flexibility of operation!
4. Less sand handling—single loading from storage to use.
5. Capacity may be doubled through use of additional barrow.

If you want *thorough* mulling, *minimum* sand handling and *real* portability at *lowest* initial and operating cost . . . then the Mulbaro is the answer! The Mulbaro is used for many different applications in large or small foundries—for core, facing and molding sand or for special batches of ladle lining or cupola patching material. Several barrows may be used alternately, thus providing the capacity of two or more mullors for slightly more than the cost of one. Write today for complete information on the Mulbaro.

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FEMA

(*Concluded from page* 192)

iron with those of gray iron, alloyed iron, cast steel and forged steel to reach conclusions which permit its use in equipment parts and tools. Several slides were presented. Of particular interest were those comparing impact resistance by a modified Izod test, notched fatigue limits and grain growth at equipment operating temperatures of these materials.

Mr. Eagan said that good techniques and control of melting is demanded for production of ductile iron. When melted under proper conditions the molten iron has good flowability although the slag formed is difficult to remove from the metal. Efficient use of skim gates is required and use of a teapot ladle was recommended.—*S. L. Jackson, Electro Metallurgical Division.*

Western New York

ALFRED A. DIEBOLD, chairman of the Western New York Chapter of the AFS presided at its initial fall meeting, held Oct. 6 at the Hotel Sheraton, Buffalo. Austin C. Ross acting as technical chairman introduced the speaker, Emil H. Lang, president, Erie Forge Co., Erie, Pa.

Mr. Lang, in a talk on "Service," stressed the importance of applying co-operation in all relations— of company to customer, townsman to local government, and citizen to country. Since everyone is working for someone else, we all serve one another. Giving the best product to the customer, at competitive prices, is not only idealistic, but fundamentally important. Mr. Lang concluded his talk by stressing that it becomes a patriotic duty to produce the best material possible.—*Marve Taublieb, Frederic B. Stevens Inc.*

AWARD: Western New York Chapter of the American Foundrymen's Society sponsored an award made to Walter Dziwulski, outstanding foundry student of Buffalo State Technical Institute, University of the State of New York. The award was presented by Alfred A. Diebold, Atlas Steel Casting Co., Buffalo, chapter chairman, Aug. 8

Metals Institute Holds Meeting

Forty-second annual autumn meeting of the (British) Institute of Metals was held this year in Bournemouth on Sept. 18-22. The Autumn Lecture on "Communications Metallurgy" was delivered on Sept. 18, by E. E. Schumacher, Bell Telephone Laboratories Inc., Murray Hill, N. J. Two technical sessions took place on the morning of Sept. 19 and 20, and the following papers were presented:

"Corrosion and Related Problems in Sea-Water Cooling and Pipe Systems in H.M. Ships," by Dr. I. G. Slater, T. I. Aluminum Ltd., Birmingham, L. Kenworthy, Royal Naval Scientific Service and R. May, British Nonferrous Metals Research Association, London. This paper presents a study of corrosion and related problems that were encountered in seawater cooling systems during wartime service. Impingement attack and deposit attack were the two most prominent types of corrosion encountered. It is shown that the main factors which influence these are water speeds with related eddies and turbulence, entangled air bubbles, tube obstructions, and contamination of the water.

Corrosion In Sea Water

"A Method of Assessing the Relative Corrosion Behavior of Different Sea Waters," by T. Howard Rogers, Halifax, Canada. Dealing with the corrosive attack of sea water on copper base alloys, the author states that such corrosion varies with the seasons of the year and also with the time during which the sample is stored before use. A simple test, known as the copper corrosion index determination (C.C.I.) has been developed to gage the corrosiveness of any particular sample of sea water. It consists in immersing a piece of copper sheet of a given area in the sample of sea water and estimating the amount of copper dissolved in 22 hours under standard conditions.

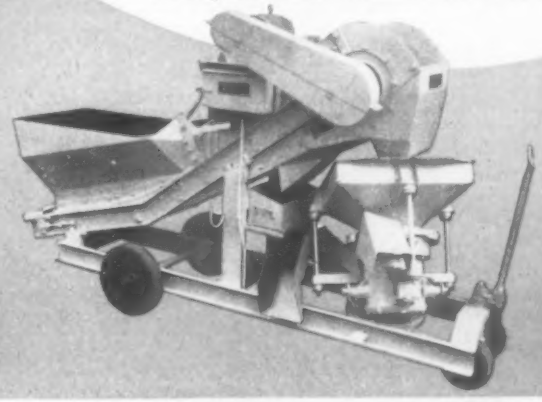
"The Jet Impingement Apparatus for the Assessment of Corrosion by Moving Sea Water," by R. May, and R. W. de Vere Stackpoole, British Nonferrous Metals Research Association, discussed the construction of the apparatus for reproducing the condition favorable for the corrosive-erosive action of impinging air bubbles in a water stream on condenser tubes and sea water pipes. The running of tests with the apparatus and the assessment of results also are discussed. Other papers included:

"Pitting Corrosion in Copper Wa-

UNSURPASSED PERFORMANCE

the junior NITE-GANG

The new Junior Nite-Gang, a portable sand conditioner for the small or medium size foundry, economically produces up to 40 tons of *completely* conditioned sand per hour! The Junior Nite-Gang is easily moved to any floor in the foundry. Shakeout sand and new sand or bonding additions are loaded directly into its hopper by front end loader, crane bucket or other means. This sand is carried by a cleated conveyor belt through an adjustable feed gate and discharged over a magnetic separator. The blended, iron free sand falls onto the high capacity Screenarator which completely screens, aerates and discharges it into bin, pile or windrow. The swivel-mounted Screenarator with adjustable discharge chute permits discharge to any distance within fifty feet and in any direction within an arc of 180 degrees.



Use the Junior Nite-Gang for complete sand conditioning . . . blending, magnetic separation, screening and aeration! Eliminate laborious hand shoveling and other manual operations! Bulletin No. 1125 fully describes the new Junior Nite-Gang and is available on request.

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reports profit of $20 a day with Pangborn Dust Control.

FOOD PROCESSOR

writes Pangborn Dust Control saves him $3048 per year.

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reports $1471 yearly profit with Pangborn Dust Control.

CHEMICAL MFGR.

states Pangborn Dust Control saves him $14,859 a year.

FEED MILLER

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REFRACTORY

executive reports savings of $4318 per year with Pangborn Dust Control.

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READ HOW PANGBORN DUST CONTROL STOPS DUST PROBLEMS LIKE THESE— *at a profit!*

As these authentic cases from Pangborn's files show, Pangborn Dust Control stops dust at a profit! Even where dust can't be sold or re-used, Pangborn users report impressive savings from $1200 to $7000 and more a year.

And where dust is valuable (made up of products or raw materials), annual savings of $12,000, $13,000 or $14,000 a year are not uncommon for Pangborn installations.

FIND OUT HOW MUCH YOU CAN SAVE! A Pangborn Dust Survey costs nothing—but will show you how you can *turn the dust in your plant* into cash savings. For details, write the PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Maryland.

Look to Pangborn for the latest developments in Dust Control and Blast Cleaning Equipment.

STOP the DUST HOG from stealing profits with

Pangborn

DUST CONTROL

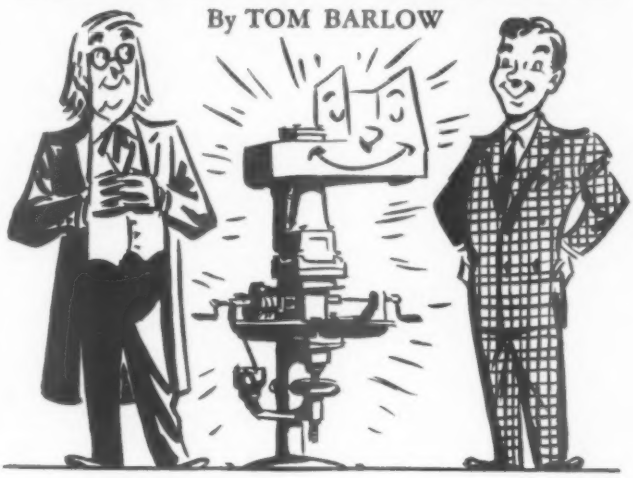
ter Pipes Caused by Films of Carbonaceous Material Produced during Manufacture," by Hector S. Campbell, British Nonferrous Metals Association; "Stress-Corrosion of Aluminum-7 per cent Magnesium Alloy," by E. C. W. Perryman and S. E. Hadden, British Nonferrous Metals Research Association; "A Theory of the Mechanism of Stress-Corrosion in Aluminum-7 per cent Magnesium Alloy," by Dr. P. T. Gilbert and S. E. Hadden, British Nonferrous Metals Research Association; "Relationship between the Aging and Stress-Corrosion Properties of Aluminum-Zinc Alloys," by E. C. W. Perryman, British Nonferrous Metals Research Association and J. C. Blade, University of Durham; "The Flow of Zinc under Constant Stress," by Prof. A. H. Cottrell, University of Birmingham, and Dr. V. Aytekin, Ankara, Turkey, formerly research student, University of Birmingham; "Mechanism of Primary Creep in Metals," by Dr. W. A. Wood and R. F. Scrutton, University of Melbourne, Australia; "The Mechanism of Creep as Revealed by X-Ray Methods," by Dr. G. B. Greenough and (Mrs.) Edna M. Smith, Royal Aircraft Establishment, South Farnborough, Hants.; "Some X-Ray Observations on the Nature of Creep Deformation in Polycrystalline Aluminum," by E. A. Calnan, National Physical Laboratory, Teddington, and B. D. Burns, Armaments Research Establishment, Woolwich; "Atomic Displacements Associated with Elasticity in Plastically Deformed Metals," by Dr. W. A. Wood and N. Dewsnap, University of Melbourne, Australia; and "The Calculation of the Activation Energies of Recovery and Recrystallization from Hardness Measurements on Copper," by Dr. N. Thorley, King's College, Newcastle-on-Tyne. A large number of works visits was arranged for members of the institute during the week, and a special program for members' ladies was organized.

GIFS Promulgates Code of Ethics

Gray Iron Founders' Society, 210 National City-East 6th Bldg., Cleveland 14, has published a code of ethics for the gray iron castings industry. The code was developed by a committee of foundry management executives and sets forth a list of provisions which constitute fair trade practices applicable to nearly all commercial situations involving suppliers, customers and competitors. Nearly all of the provisions are statements of federal laws in businessmen's language. Free copies are available.

LET'S KICK IT AROUND

By TOM BARLOW



Sing a song of air, of
Blowing cores and sand;
Four and twenty cores all
Dense and strong and grand!
When the job is finished,
Hugh Dunit starts to sing:
"Now that fulfils my every wish;
Yea, Kor Flo is the thing!"

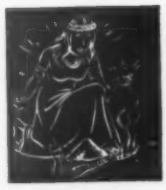
—Apologies to Everybody

Once upon a time in the land of Broken Kores lived a noble foundryman known to all and sundry as Hugh Dunit. Lo, his troubles were many fold and his spirit sore and depressed. He was a good core-maker, the seventh son of a seventh son of a core-maker, but the wise words of his forefathers availed him not. For into Hugh Dunit's life had come a strange and awesome Machine which up-ended many of his established habits. Many "truths" of his father were no longer true, and much experience seemed "gone with the wind." For that reason, and others, Hugh Dunit called his machine "Core-Blower". Many times he blessed his new possession for its strange ability to produce at alarming speed. Other times he pondered on the peculiar traits it showed and its apparent whims and fancies.

One day a wise traveler passing through Broken Kores heard Hugh Dunit moaning and gnashing his teeth and crying out, "Oh, Core-Blower, you strange beast, why do you blow good today and bad tomorrow?"

The wise man (who was not wise enough to mind his own business) gave forth: "Prithee, speak not so to a mere machine. It can not hear. Verily it hath neither feeling nor brain matter. Doth it behave badly, you can not punish it; nay, you must understand it and fix it. Let me help you understand this creature and you will come to love it dearly." At this, Hugh Dunit brightened; in sooth, both he and the wise man got lit.

"Vouchsafe first to me what grieveth thee most, Hugh."



"Truly," complained Hugh Dunit, "this strange machine maketh some cores strong and some weak even when fed a uniform diet of expensive sand, delicious cereal, and the best of oil. I have purchased at great expense, and still owe for, testing machines and oracles. These oracles aver that the sand is strong, yet it is weak. Can it be that evil spirits are at work?"

The wise man racked his brain, chalked his cue, and spoke thus: "The test oracle saith unto you the truth. Yea, the sand is strong, BUT (and never let this thought be lost) only when the sand is rammed to proper density. Verily, then, if the core you produce is anemic, it must be that it is not dense; even as a sponge it may be. The sand grains are too far from one another. The sand grains follow the teaching of our fathers, 'United we stand, divided we fall'."

(Hugh) "But how can I control such things, Oh wise and illustrious advisor?"

(Advisor) "First, you must design well your box. Remember always that sand is not blown or pushed into a box—it is carried or sucked in. Air rushes into the box laden with sand even as a bee is laden with honey. The air must escape quickly through ye olde vents, but the sand stayeth behind to produce a shape or core. Density, therefore, is closely related to the amount of air which can rush into and out of the box. Think not of how much sand will enter the box. Think of air—the sand will come along quietly and as docile as a maiden in love."

(Hugh) " Are then my troubles all with my box?"

(Advisor) "Nay, not so, because core sands vary in blowability even as maidens vary in many respects. Even a wise man knoweth not always which ones are the phonies. Howsoever, many factors *are* known and can be controlled. If you would have good results you must control permeability, grain distribution, green strength, mulling time, and moisture content. You must avoid, as you would the plague, oils which produce sticky sands and core mixes with too much cereal or water (or too much of anything).

"Also", continued Old Man Wisdom, "be mindful that even when all such factors are observed, there are mysterious characteristics which are not fully known to even the seers and soothsayers. Some cores require even more blowability than can be obtained from ordinary important controls. In such a predicament try a modicum (½ pint per 100 pounds sand) of the strange and wonderful chemical called KOR FLO. It will not replace good practice, but it will increase blowability of good core-mixes—yea, even to 5 to 10 per cent, and thereby produce dense cores of strength adequate and well received."

With these words the wise man vanished, leaving Hugh Dunit to leaf through the pages of FOUNDRY to find the purveyor and deliverer of KOR FLO—and behold, *this is the page!*

★ ★ ★

EASTERN CLAY PRODUCTS, INC.

"Bonding Clays Sold With Service"

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DIXIE BOND • BLACK HILLS BENTONITE • REVIVO BOND • REVIVO SUPER BOND • BALANCED REVIVO

PROBLEMS?
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Just by telling us that you have roll wheel grinding problems, you can get job-side help quick from an Electro Technically Trained Field Engineer.

He will bring you the benefit of our long experience with wheels for grinding hot mill rolls of Hardened Steel, Cast Iron and Chilled Iron.

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GRINDING
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Conference Program Is Arranged

Nine technical sessions tentatively have been scheduled for the eighth annual conference of the Electric Furnace Steel Committee of the American Institute of Mining and Metallurgical Engineers. Meeting will be held at Hotel William Penn, Pittsburgh, on Dec. 7, 8 and 9. Tentative program includes the following:

Thursday, Dec. 7
9:30 a.m.—Acid and Basic General Session
9:45 a.m.—Acid and Basic Session on Raw Materials
2:00 p.m.—Basic Session on Continuous Casting
—Acid Session on Oxidation Practice (Boil).
6:30 p.m.—Reception and Cocktail Party
7:00 p.m.—Annual Fellowship Dinner

Friday, Dec. 8
9:30 a.m.—Basic Session on Furnace Maintenance and Rebuilding
—Acid Session on Experience with Special Deoxidizers
2:00 p.m.—Basic Session on Melting Practice
—Acid Session on Temperature Control

Saturday, Dec. 9
9:30 a.m.—Educational Session

England Studies Air Contamination

The Joint Iron Council, in co-operation with the Council of Ironfoundry Associations, England, will provide an advisory service on dust and fume problems in iron foundries. The work is being carried out through the British Cast Iron Research Association under supervision of the foundry atmospheres committee. Close collaboration is being maintained with the joint standing committee on conditions in iron foundries set up by the factory department of the Ministry of Labor.

Book Review

Machinenformerei (Machine Molding), by U. Lohse and H. Allendorf, paper, 72 pages, 6 x 9 in., published by Springer-Verlag, Berlin, Germany. Price 3.60 DM.

This volume is the second edition of one of a series of workshop manuals, and relates to production of castings on molding machines. It is divided into three main sections describing working principles of the molding machine, machines for manufacturing the (outer) mold, and machines for producing cores. First section discusses methods of ramming or compacting sand, stripping of mold and pattern, and effective use and operation of molding machines. The second describes machines employing hand ramming, hand squeezing, pneumatic squeezing, jolt ramming, jolt-squeeze ramming, and centrifugal force or sandslinging. Final section on coremaking machines deals with those using hand ramming, mechanical ramming, and blowing.

Carbon Monoxide

NO MENACE TO B&W REFRACTORIES

Twelve years of uninterrupted service is the record established by B&W Refractories in a continuous malleableizing furnace operating under high CO atmosphere.

Refractories previously used in furnaces of this type disintegrated rapidly due to the reaction between the prepared atmosphere and impurities in the brick. But with B&W Refractories, brickwork maintenance has been negligible.

Today, this furnace and five similar furnaces in the same plant—all equipped with B&W IFB linings and B&W 80 Firebrick piers—**are malleableizing 450 tons of castings a day without interruption!**

Equally important, the use of B&W Insulating Firebrick has helped to reduce cycle time from 72 hours—required in old type furnaces lined with heavy firebrick—to 30 hours. Significant fuel savings, and improved product quality through closer temperature control have also been achieved.

If you are looking for ways to increase your production and decrease your costs, the use of B&W Refractories in your furnaces will prove of assistance. Your local B&W Refractories Engineer will be pleased to discuss your problems with you.

R-324

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B&W 80 FIREBRICK • B&W JUNIOR FIREBRICK
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•

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Foundry STATISTICS

Ingot Brass and Bronze

(Shipments in net tons)

	1949	1950
Jan.	19,456	18,874
Feb.	15,026	18,487
Mar.	14,550	22,494
Apr.	10,695	22,118
May	11,114	23,643
June	9,696	25,093
July	10,220	21,609
Aug.	14,194	29,689

Source: Ingot Brass and Bronze Industry.

Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1949	1950
Jan.	149.9	159.3
Feb.	144.4	113.1
Mar.	190.8	225.2
Apr.	172.0	160.6
May	121.9	294.9
June	164.9	622.7
July	146.6	401.8
Aug.	127.1	693.6
Sept.	166.6	....
Oct.	133.5	....
Nov.	270.4	....
Dec.	201.0	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Foundry Production Workers

Estimated Number

	June 1950	May 1950	June 1949
Iron & Steel	200,100	193,000	184,000
Nonferrous	77,700	73,600	59,500

Average Weekly Earnings

Gray Iron	$64.19	$63.44	$52.67
Malleable Iron	65.75	63.32	53.70
Steel	65.84	63.49	54.73
Nonferrous	66.64	65.36	59.94

Average Weekly Hours

Gray Iron	42.4	41.9	36.4
Malleable Iron	41.8	40.8	35.4
Steel	41.7	40.7	36.2
Nonferrous	41.6	40.9	38.5

Labor Turnover Rate (June)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	6.5	3.2	1.8	0.5
Malleable Iron	5.8	3.1	2.3	0.2
Steel	5.4	2.9	1.7	0.5
Nonferrous	7.0	3.4	2.0	0.4

Source: Bureau of Labor Statistics.

Shipments of Castings

(Reported by Bureau of the Census)

Gray Iron

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1948			
Total	12,785,909	7,131,405	.....
1949			
July	696,915	341,657	1,031,963
7 mo.	6,500,064	3,381,892	.....
Aug.	872,013	445,981	1,048,308
Sept.	880,647	459,014	980,070
Oct.	715,685	397,939	955,100
Nov.	718,703	395,107	938,629
Dec.	862,172	440,409	892,458
Total	10,549,284	5,517,527	.....
1950			
Jan.	913,321	449,577	914,185
Feb.	864,189	416,594	873,455
Mar.	995,782	500,195	921,575
Apr.	981,126	483,862	922,255
May	1,095,111	572,887	977,833
June	1,136,129	613,084	1,039,619
July	961,450	507,867	1,286,579
7 mo.	6,947,108	3,544,066	.....

Steel

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1948			
Total	1,760,032	1,335,295	.....
1949			
July	78,474	50,124	155,494
7 mo.	840,346	598,005	.....
Aug.	89,849	59,412	143,566
Sept.	87,117	55,853	127,664
Oct.	71,295	48,263	124,817
Nov.	76,820	50,685	117,865
Dec.	85,033	53,079	122,887
Total	1,250,460	865,297	.....
1950			
Jan.	88,821	57,996	142,484
Feb.	91,827	62,045	165,186
Mar.	111,772	77,588	185,611
Apr.	106,904	75,133	201,643
May	117,944	83,845	198,078
June	131,097	94,637	206,799
July	98,269	68,874	255,418
7 mo.	747,979	520,118	.....

Malleable

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1948			
Total	933,265	525,212	.....
1949			
July	44,360	23,216	70,796
7 mo.	549,362	287,703	.....
Aug.	58,121	30,327	61,330
Sept.	60,723	30,781	57,512
Oct.	57,150	28,582	54,322
Nov.	49,439	25,250	55,795
Dec.	57,379	29,679	60,835
Total	713,330	371,214	.....
1950			
Jan.	62,874	32,918	62,307
Feb.	60,386	31,249	67,049
Mar.	66,259	38,639	69,866
Apr.	69,822	36,279	76,250
May	76,161	42,432	77,074
June	82,345	46,613	86,783
July	67,514	37,198	105,300
7 mo.	485,361	265,328	.....

Aluminum

(Thousands of pounds)

	Shipments Total	Sand	Perm. Mold	Die	Unfilled *Orders
1948					
Total	424,490	139,781	161,334	118,738	.....
1949					
July	18,621	6,311	6,592	5,180	36,993
7 mo.	170,820	58,938	59,139	48,488	.....
Aug.	23,997	9,048	8,326	6,119	38,130
Sept.	27,546	9,923	9,491	7,623	38,179
Oct.	29,071	9,634	9,923	8,908	37,881
Nov.	26,317	9,212	8,315	8,348	36,846
Dec.	26,762	10,070	7,714	8,430	36,921
Total	304,616	106,825	102,908	88,019	.....
1950					
Jan.	28,801	9,646	9,400	9,052	40,591
Feb.	28,887	10,171	9,358	8,851	44,235
Mar.	35,845	13,035	11,094	10,870	47,350
Apr.	33,356	11,091	10,656	10,795	49,952
May	36,031	11,526	11,928	11,799	52,580
June	37,600	12,677	11,825	12,173	53,309
July	32,794	10,393	11,276	10,337	70,940
7 mo.	233,246	78,539	75,537	73,809	.....

Magnesium

(Thousands of pounds)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1948			
Total	8,214	7,488	....
1949			
July	689	637	3,073
7 mo.	5,506	5,108	....
Aug.	753	712	3,107
Sept.	727	691	3,015
Oct.	796	763	3,050
Nov.	801	769	2,399
Dec.	781	738	2,216
Total	9,364	8,781	....
1950			
Jan.	814	762	2,237
Feb.	735	676	2,218
Mar.	903	849	2,322
Apr.	799	751	2,305
May	810	762	2,282
June	758	698	2,482
July	763	713	3,587
7 mo.	5,582	5,211	....

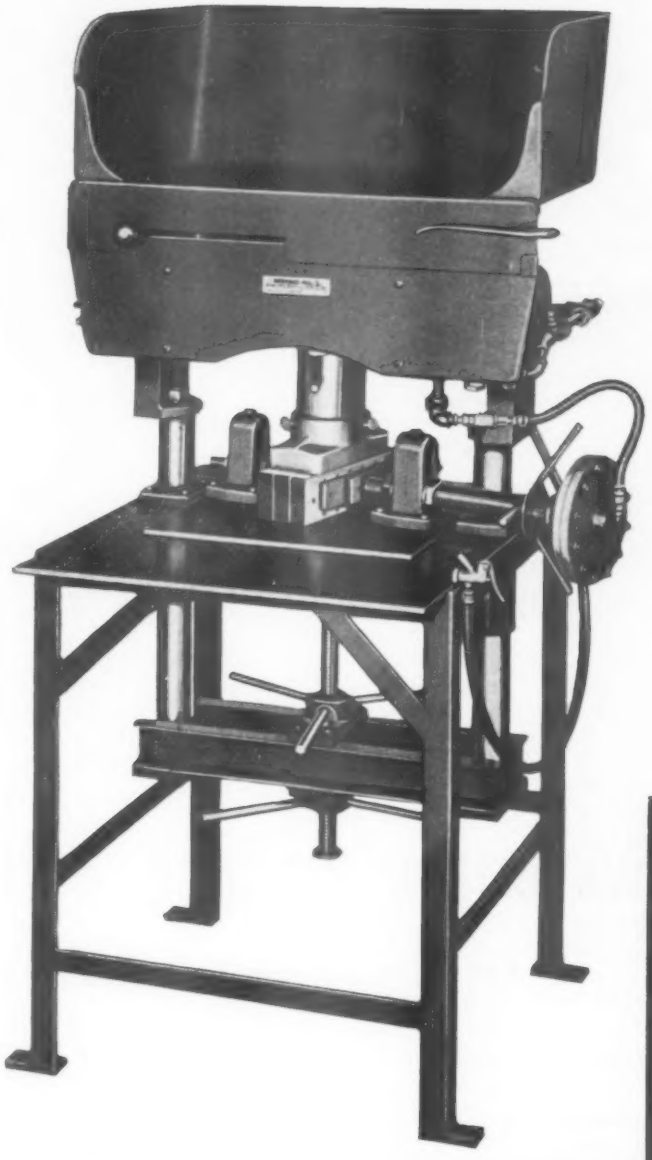
Copper-base Alloys

(Thousands of pounds)

	Shipments Total	Shipments Sand	Shipments Perm. Mold	Unfilled *Orders
1948				
Total	1,030,825	930,790	59,009	.....
1949				
July	43,273	39,372	2,129	26,013
7 mo.	421,766	378,199	23,440	.....
Aug.	58,055	53,203	2,929	26,071
Sept.	60,771	55,221	2,729	26,527
Oct.	58,249	52,861	2,316	23,634
Nov.	61,818	56,669	2,811	23,625
Dec.	63,873	58,291	3,086	23,435
Total	725,318	654,444	37,311	.....
1950				
Jan.	65,585	58,878	3,440	25,216
Feb.	67,029	60,257	3,626	26,923
Mar.	80,442	71,876	4,693	27,631
Apr.	72,318	64,773	3,848	28,769
May	79,108	71,605	3,751	30,880
June	83,023	74,990	3,896	32,808
July	69,033	62,414	3,789	39,906
7 mo.	516,037	464,793	27,043	.....

* For sale only.

Redford CORE BLOWERS



REDFORD NO. 2 STATIONARY MAGAZINE TYPE CORE BLOWER . . . . .

New standards are being set with this machine, because every motion of your operator has been correctly evaluated to obtain a maximum of production with a minimum of effort.

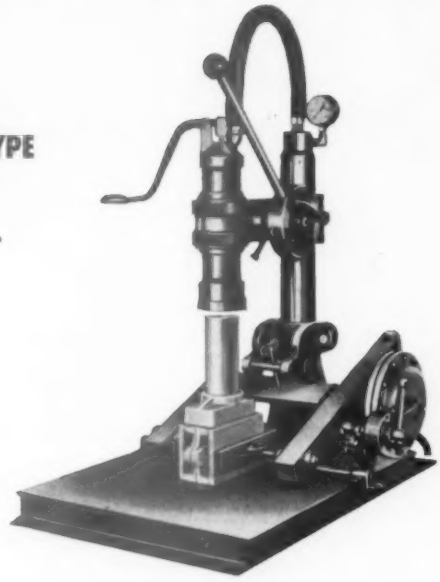
8 OUTSTANDING FEATURES:

1. Large stationary work area.
2. Large sand supply hopper.
3. Stationary sand magazine.
4. Easy accurate locating of core boxes.
5. Quick change magazine heads.
6. Quick adjustment for different height core boxes.
7. Quick change, fully adjustable, vertical clamping attachment.
8. Actuating one handle clamps the core box, blows the core and releases the core box, in two seconds.

CAPACITY: Cores up to 5#

Write for Specification Bulletin "F"

REDFORD CARTRIDGE TYPE BENCH CORE BLOWER . . . . .



The original small core blower . . Proven simplicity, speed and flexibility. Makes cores up to 2#.

Thousands in use in American Foundries . .

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Redford IRON & EQUIPMENT CO.

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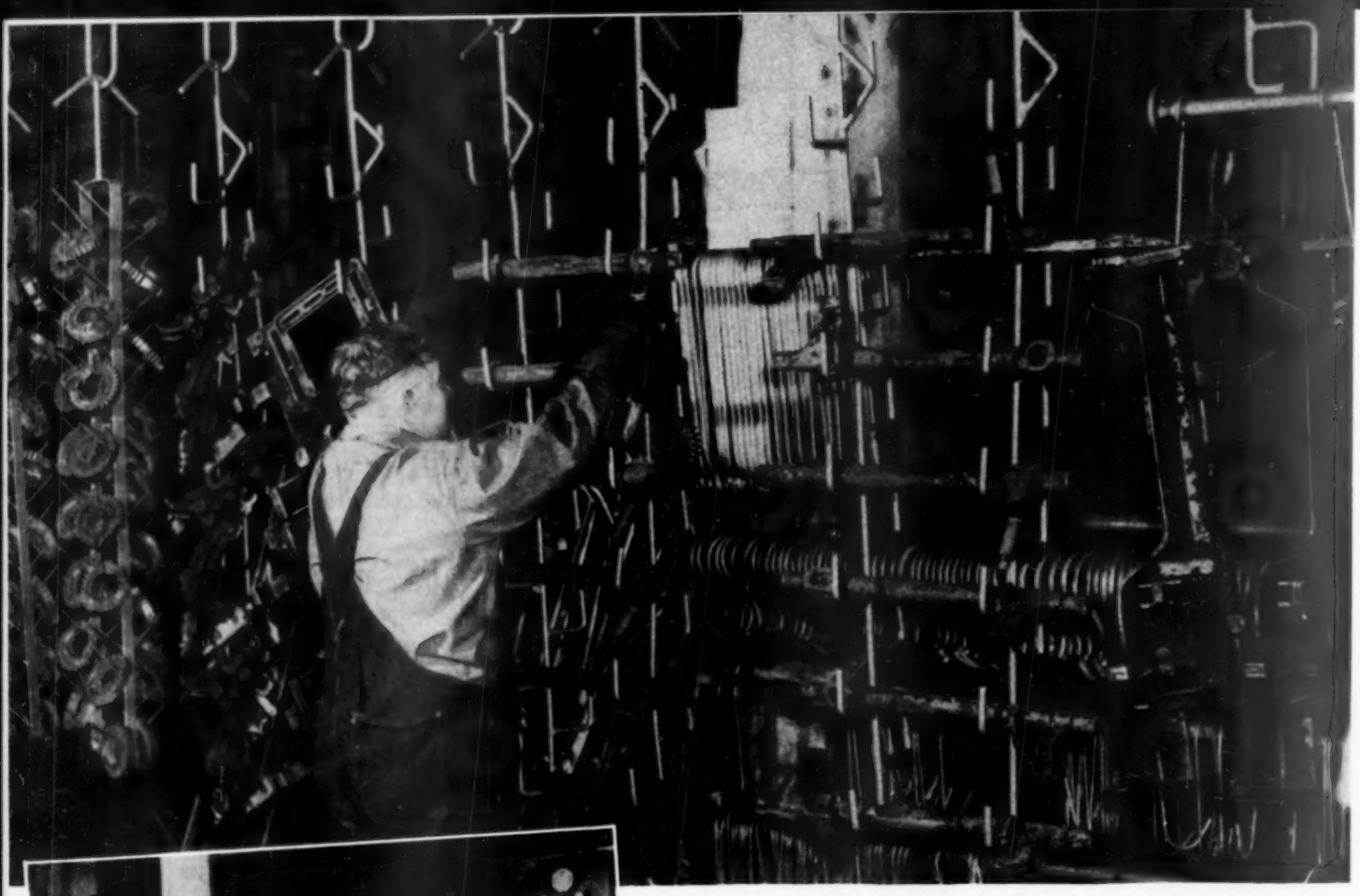


Fig. 1 (above)—Small castings are hung on racks of tree and other designs. Castings must be placed so that the blast is directed on all surfaces to be cleaned. Fig. 2 (left)—Controls for the four motors of the blasting unit

Conveyerized Blasting Unit

Provides Economical Cleaning

By VICTOR E. HILLMAN
Director of Research
Crompton & Knowles Loom Works
Worcester, Mass.

MARKED increase in economy has been realized by the recent installation of a new Wheelabrator cabinet for the cleaning of 30 to 40 tons of gray iron castings a day in the foundry of Crompton & Knowles Loom Works, Worcester, Mass. This single unit is served by a 170-ft loop of overhead monorail conveyor, and consolidates cleaning operations formerly performed by three other types of equipment.

Only four men are required to operate the new equipment, and their working conditions are good in that they work well away from the blasting area. All dust is kept away from the room, and there is relatively little noise. In addition, a more orderly and efficient flow of material is effected.

Loomsides, which are among the largest castings cleaned, (Figs. 3 and 4), now are being cleaned at the rate of 100 per 2½ hours. The only manual labor involved is that required to hang castings on conveyor hooks and remove them when cleaned. This work is facilitated by power hoists on a parallel track. Hooks are spaced on 16-in. centers and each has a capacity of 500 lb.

The conveyor moves at a speed of 9 ft a minute, hence time of passage through the cabinet is short, as it measures only 30 ft from the heavily rubber curtained inlet to a similarly curtained outlet.

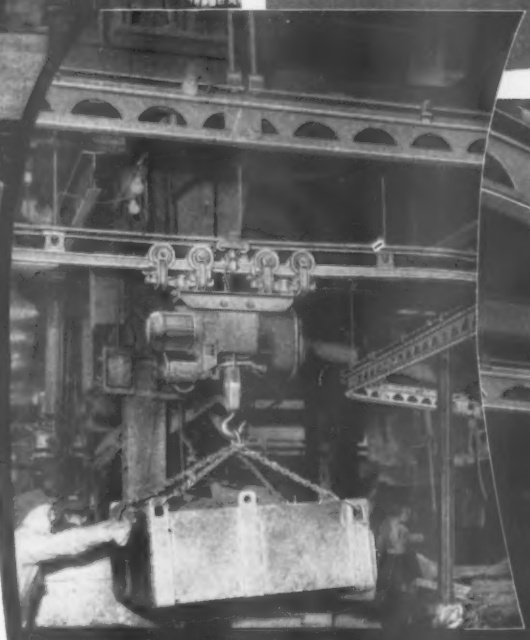
Many of the castings cleaned are small enough to be loaded in multiple to a rack of which several designs are used, as shown in Fig. 1. Some racks hang from individual hooks; others hang from two hooks because this permits use of a rack better adapted to holding particular shapes of castings. Castings must be so placed, of course, that all surfaces will be exposed to the blasts. Racks of tree-like design are suited for many small parts and the racks add greatly to the number of castings that can be put through the cleaning cycle per hour.

Paralleling the loading leg of the loop is a long row of fixed hooks on which racks are often hung while being loaded or unloaded. When filled, these racks are quickly transferred to conveyor hooks. This arrangement helps to keep loaders busy when

(*Concluded on page* 206)

3 TIME-SAVING STEPS IN HANDLING MOLDS TO SHAKEOUT

Dumping molds into shake-out box at pouring floor in a steel foundry.



Heavy loads are easily pushed on smooth overhead rails.

Molds are quickly emptied into shakeout by tipping box with air (or electric) hoist.

The handling of molds to shakeout is one of the many jobs simplified and speeded by overhead Cleveland Tramrail equipment.

Ten or more molds, depending on size are quickly dumped into a shakeout box at pouring floor. The box is conveyed to the shakeout on smooth overhead Cleveland Tramrail cranes and trackage by an easy rolling carrier that may be either of the hand-propelled or motor-driven type. When over the shakeout, it is quickly tipped and emptied by an air or electric hoist.

The same Cleveland Tramrail equipment also cuts costs in delivering molds to pouring floor and speeding pouring operations.

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Fig. 3—Loomside castings as they appear before cleaning. Each of these castings hangs from two conveyor hooks

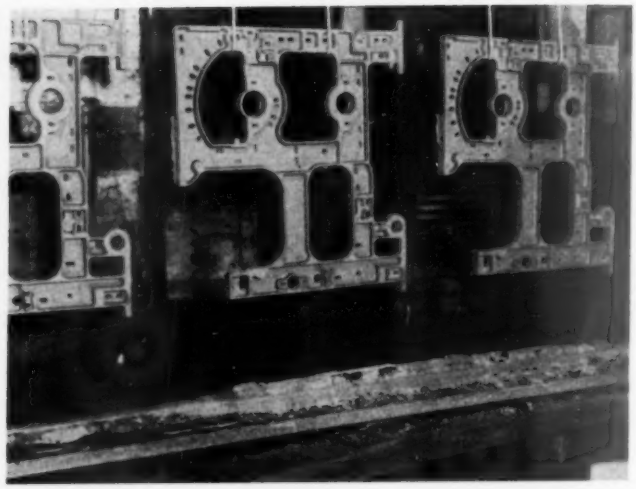

Fig. 4—Some of the loomside castings as they appear after blasting and ready for removal from the conveyor

(*Concluded from page* 204)

there is lack of loading space on the conveyor. It also keeps the racks at a fixed point and reduces the walking sometimes required when loading or unloading moving racks. Loaders pick castings from tote boxes or skids spotted near the conveyor and return castings to these carriers after the castings issue from the blasting cabinet.

Within the cabinet are four centrifugal units, 19½ in. in diam and 2½ in. wide. These are set in a staggered arrangement, one high to direct the blast somewhat downward and one low with the blast directed somewhat upward. On the opposite side, this arrangement is reversed. The object, or course, is to have the blasts strike and clean all surfaces of the castings in a single trip through the cabinet. Each wheel unit has its own driving motor and throws 300 lb of abrasive per minute.

The blast used is half No. G14 steel grit and half No. S390 steel shot. After striking the castings, the abrasive falls into a pit along with sand cleaned from castings, is elevated to a point where fines are separated and feed out through a chute into a disposal car. New abrasive is fed in as needed. Castings usually are adequately cleaned in a single transit but, if not, a second trip without removal from the conveyor hooks is made.

Some of the castings cleaned are as much as 12 ft long and are supported horizontally from two or more hooks. Also cleaned are a few lengths of shafting up to 12 ft long, and occasional batches of forgings. From 3 to 5 tons of work per hour are cleaned, depending upon the type of work scheduled.

Blasting done in the new cabinet is confined (except for shafting and forgings) to castings that are either too large to handle in airless blast barrels or that might be damaged if put through such units in bulk loads. Many small castings are thus handled in bulk because this saves handling time and still results in efficient cleaning. The barrel units, both formerly used, continue in operation.

The Camera—A Useful Foundry Tool

(*Continued from page* 113)

ence of discovering defective castings after machining. By radiographic inspection of the parts in question, faulty units never reached machine-side. For each casting thus scrapped an average machining cost of $25 was saved. Radiographic examination of pilot castings is standard practice in numerous foundries and radiographic, nondestructive testing of complete foundry output is not uncommon. Radiography is in large measure responsible for improved production methods, superior gating and feeding systems, as well as scientific control over coring, pouring and other phases of founding.

Conventional radiographs require comparatively lengthy exposures. Developed during the war and used extensively in experiments leading to the atom bomb is high-speed radiography which produces a clear x-ray picture in one-millionth of a second. Of more recent origin is high-speed cineradiography (x-ray movies) which snaps 100 or more individual and consecutive radiographs in a single second. Both techniques hold promise for solution of many problems connected with metal flow in casting molds. Such studies are possible because x-rays are unaffected by strong light and fumes which obscure conventional photographic equipment.

Another new radiographic development prompted Dr. D. T. Scag of the University of Illinois to state recently that "radiographic inspection of forgings, castings, welds, and machine assemblies up to about 2 feet thick (is) practical. In just a matter of minutes, flaws from 1/32 to 1/10 inch in diameter are easily detected. The characteristics of absolute sensitivity and very weak secondary fog permits the detection of such flaws located at any depth within the specimen." Obviously, he was not speaking of ordinary radiographic equipment. Instead, he was referring to the betatron, a mammoth device which twirls electrons about until they attain a speed 99.7 per cent that of light. The electrons are then ejected and, on striking the target, are slowed down and converted into x-rays. These pass through the specimen and are recorded on radiographic film. A mobile, 10,000,000-volt betatron, constructed by General Electric, is being used for basic research by the Army. Stationary units capable of delivering 20,000,000-volt x-rays are now being utilized in several universities and research foundations on basic metallurgical and foundry studies.

Less complicated as to equipment and of broader utility is the radiographic technique called x-ray diffraction. Instead of delivering an image of the metal under study, x-rays are used to produce a modified self-por-

(*Continued on page* 208)

LARGE CAPACITY...

HIGH PRODUCTION

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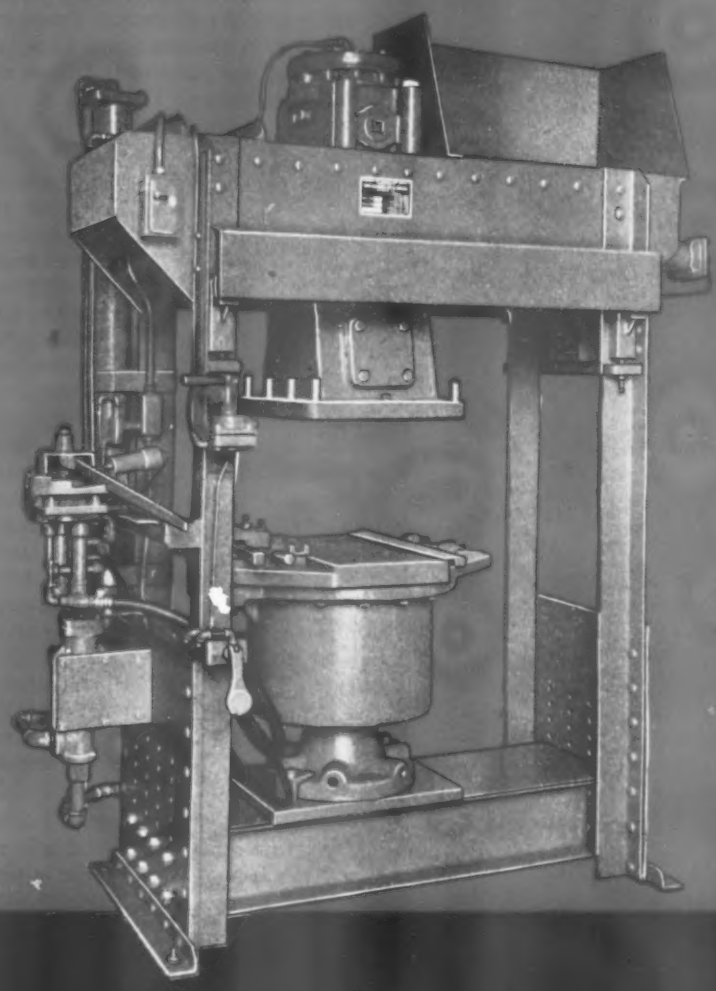
"E" SERIES CORE BLOWERS



Readily adaptable to a wide range of core making requirements, Demmler "E" Series core blowing machines combine large capacity with high rate of production.

THIS MEANS PROFIT FOR YOU!

Demmler "E" Series core blowing machines have a number of outstanding features that place them way out front.

Strong, structural steel frames rigidly support the machines and allow for varying heights as required for the core box and draw. The draw cylinder has a long center guide stem that slides in a sleeve, assuring an extremely accurate draw. Table height is adjustable so that only the required amount of draw need be used.

The standard machine is operated by two hand valves. One of these moves the carriage from filling to blowing position. The other raises the table, clamps the core box, blows and then draws the core.

A semi-automatic control valve, with which these machines may be equipped, is also available. One movement of the valve lever puts the machine through one complete cycle of operations.

This method of operation is ideal when duplicate drag half core boxes are used, since the operator can remove one core from the box and prepare the box for blowing while the machine is going through the cycle of blowing another core.

These machines are made in four sizes to meet the requirements of every kind of production core work.

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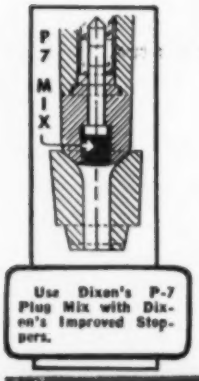

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Since 1827
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(*Continued from page* 206)

trait. The basic principle underlying this technique was well stated by the noted British photographer, D. A. Spencer: "X-rays, when suitably reflected from surfaces, form diffraction patterns on photographic plates which will reveal the architecture of the molecular structure of matter to a depth of a few hundred atoms." These patterns vary according to the material as well as the material's atomic structure. For example, steel will create a pattern entirely different from those of lead or mercury. Hardened steel, tempered steel and annealed steel will all produce different patterns. If two or more elements are compounded, the alloy will have its own distinctive pattern; however, if the elements are only mixed together, the result will be several superimposed patterns, one for each of the elements. Crystalline and noncrystalline materials give different types of patterns, so that various stages in the transition of a material from one state to the other can be observed.

Provides Wider Control

X-ray diffraction technique enables the metallurgist to operate on the atomic level and, as result, to have much broader control over the materials with which he works. There are a startlingly large number of uses for this method in basic and applied foundry research. Some of these are: Establishment and maintenance of scientifically correct annealing temperatures, study of carbon content as related to annealing, scientific determination of structure and composition of alloys, investigation of effects of annealing or other heat treatment on metals, determination of uniformity and depth of surface hardening, study of effects of gases on the structure of metals, preparation of new alloys and prediction of the properties of new and untried metal combinations, measure of residual and elastic surface stresses on metals, and many more.

Since the x-ray diffraction pattern is a picture not of a metal but the effect of the metal's atomic crystal structure on the x-rays, identification of the pattern must be done comparatively. For example, to identify hardened steel, a diffraction pattern made earlier on a known piece of hardened steel is necessary. In essence, the process is comparable to police methods for identifying criminals by means of fingerprints. Electron diffraction patterns, obtained by modifications in existing electron microscopes, also present a picture of the atomic arrangement of metals

and a wide range of other materials.

Many of the camera techniques mentioned here have been borrowed from other fields of science. Spectrography is no exception. Its origin is astronomical. It has been stated that the application of "spectrochemical analysis to the control of the composition of alloys has been one of the outstanding developments in the nonferrous metal industry during the past ten years. Refining operations can be followed step by step and many firms now control their foundry output by this method."

A spectrographic print is like a soldier's campaign ribbon. Each color combination on the decoration indicates the past military history of its wearer. The same holds true for metals. When copper is vaporized in a carbon arc chamber, the metal sends out a unique spectral pattern which is recorded on photographic film in a spectrograph. This color pattern remains unchanged even if the copper is alloyed with any number of other metals. Each of the alloys' component elements will send out its own color code. Copper, gold, sliver, molybdenum, chromium, radium, barium, strontium, calcium, magnesium, cerium, rubidium, potassium, sodium and lithium can be ferreted out spectrochemically from an alloy when present on the order of one part in a million. Iron, aluminum, and the remaining metallic elements can be detected when they constitute less than 1/100,000 part of an alloy. Spectrochemical analysis is extremely rapid, requiring less than 1/12th the time necessary for conventional chemical means.

Method Is Rapid

The obvious use for this camera technique is in qualitative analysis of foundry products. By recently perfected means—notably the microphotometer—rapid quantitative anlyses are also possible. At the Campbell, Wyant & Cannon Foundry Co., to take but one example, molten cast iron is spectrographically analyzed prior to pouring while the metal is still in the coupola. This analysis, in which six elements are checked, takes less than seven minutes. It has been estimated by J. A. Schuch, the Henry W. Dietert Co., that "the metal used in the construction of 95 per cent of the products fabricated of aluminum and magnesium alloys are analyzed at least twice by spectrographic means; first by the producer of the basic metal, and again when the metal is alloyed."

In considering the camera as a tool in foundry operations, company size is less of a limiting factor than

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CAN YOU USE PART . . . . . OR ALL OF THESE BUILDINGS?

A—is a brick foundry building, 57,222 square feet, steel frame, equipped with monorail; has two spaces 80′ x 320′ each with no post or other obstruction whatever. In the attached building are two No. 7 Whiting cupolas, each 72″ in diameter, with two blowers and each can be connected with either cupola. **B**—is a brick manufacturing building, 74,520 square feet, heavy mill construction, equipped with automatic sprinklers. **C**—is a brick nickel plating building, 4,020 square feet. **D**—is a frame warehouse; has 12,758 square feet. **E**—is a brick crating building; has 6,500 square feet. **F**—is a brick pattern vault, and pattern shop; has 2,400 square feet.

•

All the above was built in 1917 or later, and is located on 8 acres of land. The above buildings also contain some steel products manufacturing equipment in operation at the present time. Arrange for inspection and consultation.

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For above buildings A, C, D, E, & F and equipment, will consider consolidation, or shares of stock in another corporation, or a new corporation, or cash, or terms, or part of more than one of the above plans. Possession can be given within 60 days. BUILDING "B" WILL BE A SPECIAL PROPOSITION.

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might be imagined. Many of the camera methods mentioned here do not require heavy capital investment in equipment. If foundry operations are not sufficiently large to warrant the establishment of a photographic department or the hiring of a full-time photographer, camera jobs, as they come up, can be farmed out to commercial or free lance photographers. Where equipment is clearly beyond the foundry's means, it can still benefit fully from the camera. Grants-in-aid to universities or sponsored projects at research foundations and commercial research laboratories bring to the small operator the use of expensive camera facilities for the solution of casting and metallurgical problems. The co-operative radiographic programs at the University of Rochester can be emulated elsewhere.

The camera is one of the newest and most useful tools brought to the forefront by the concentrated research of the past decade. As in all else, progress in foundry operations depends in large measure on the degree to which available tools are employed. In evaluating these tools the camera should be given serious consideration.

SOURCES OF ILLUSTRATIONS

Figs. 1, 3, 9—Battelle Memorial Institute, Columbus, O.
Fig. 2—Recordak Corp.
Figs. 4, 5—Dow Chemical Co., Midland, Mich.
Fig. 6—Armour Research Foundation, Illinois Institute of Technology, Chicago.
Fig. 7—Electro-Alloys Division, American Brake Shoe Co., Elyria, O.
Fig. 8—American Brake Shoe Co., Mahwah, N. J.

Book Review

ASTM Standards, Part 2 Non-Ferrous Metals, 1140 pages, 6 x 9 in., published by the American Society for Testing Materials, Philadelphia 3. Price $8.

This 1949 edition of standards and tentatives is a triennial publication of the ASTM, and comprises the second volume of a series of six. It contains 230 standards relating to the various nonferrous metals. The book is divided into nine main sections dealing with copper and copper alloys; aluminum and magnesium and their alloys; die-cast metals and alloys; metal powders and metal powder products; electrical heating, resistance and related alloys; electrodeposited metallic coatings; corrosion tests; nonferrous metals and alloys, and general methods of testing.

Pages are divided into two columns to provide easy reading, and three indexes permit rapid location of any standard under its particular grouping such as copper, aluminum, etc.; under its numerical designation, and under alphabetical listing.

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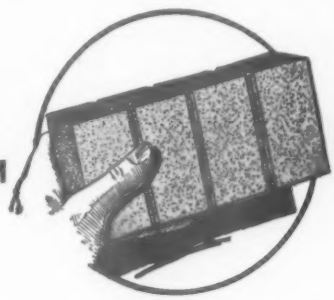

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J. I. Case Co. Modernizes

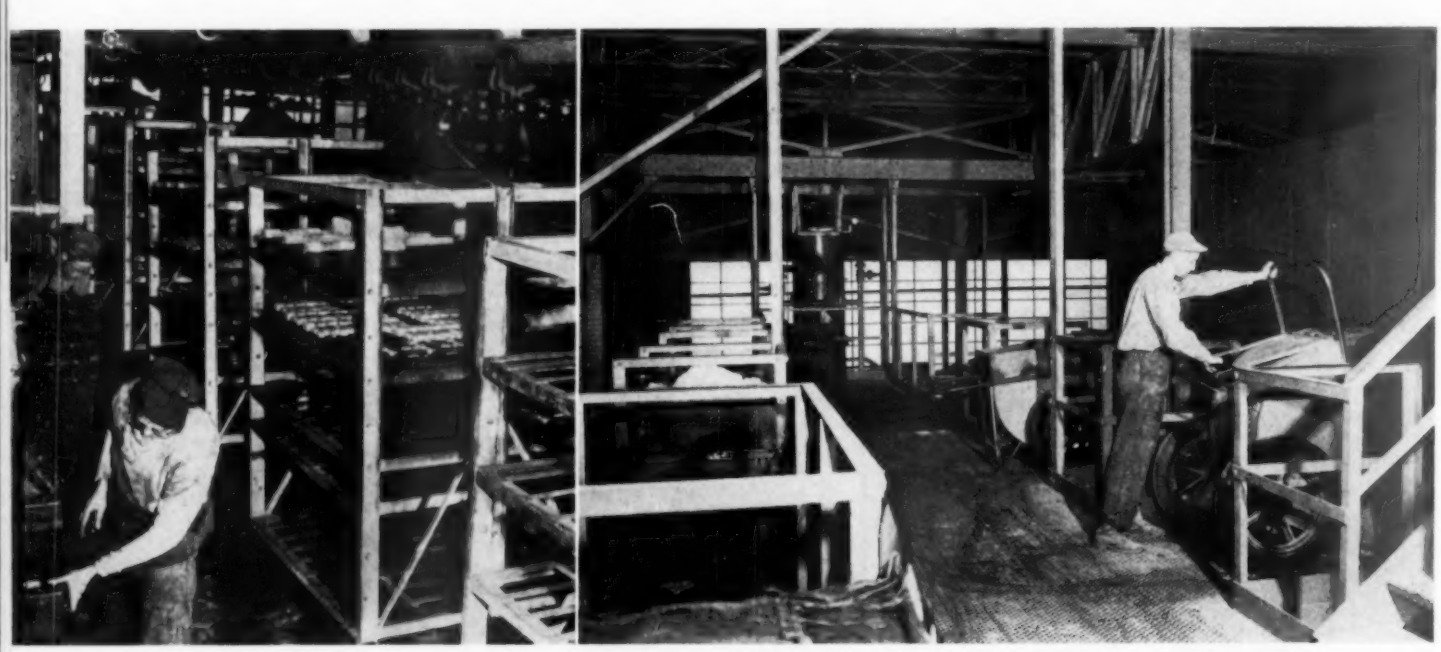
Coremaking Facilities

ABOUT two years ago the J. I. Case Co. modernized its coremaking facilities in the tractor and implement foundry of the company's Rock Island, Ill., works. The project was a major one involving the building of an addition to the existing coreroom, 110 ft long by 60 ft wide, to house the new conveyorized system.

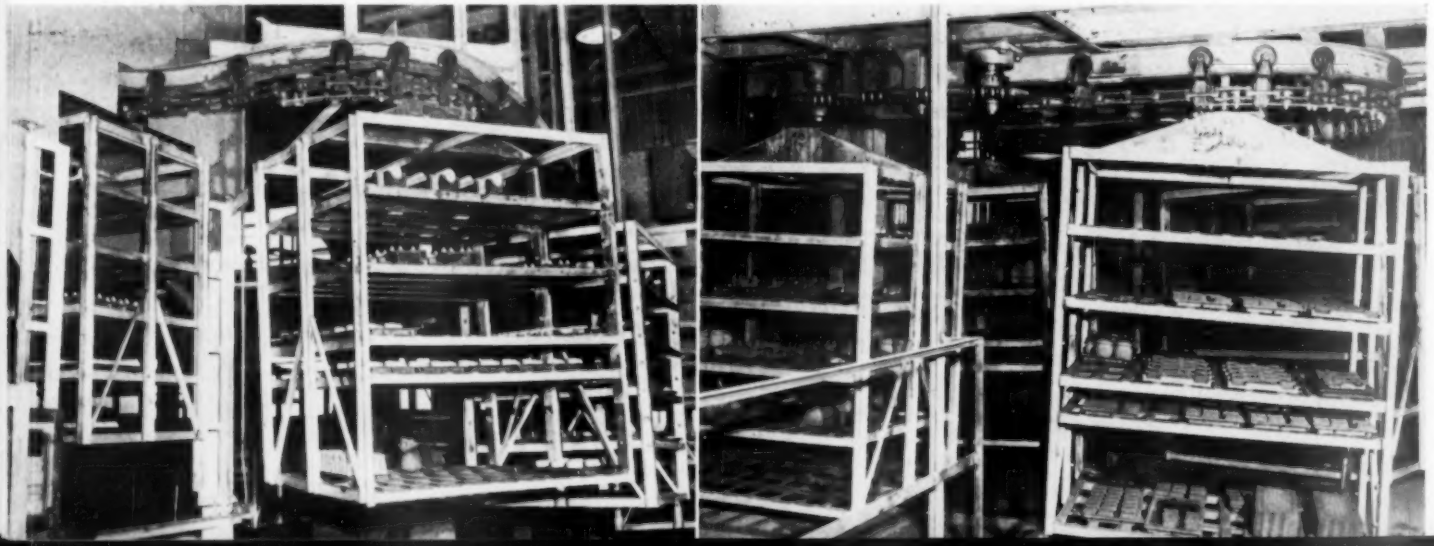
The Despatch Oven Co., Minneapolis, designed, built and installed the core baking equipment which replaced obsolete batch type ovens and eliminated the extensive manual operations previously necessary in core handling. Manual handling of sand by coremakers also was eliminated by installation of an overhead sand distribution system, which supplies the sand to individual hopper at ten core blowing stations. The hoppers are filled from an overhead "bridge" by merely dumping the sand into them from pneumatic-tired sand carts (Fig. 2).

According to Stanley Olson, foundry superintendent, the new system has effected savings of over 25 per cent in core handling and has reduced core breakage and rejects by more than 25 per cent. He also stated that core quality has improved over 50 per cent and that, core gas in the coreroom has been reduced.

(*Concluded on page* 214)



Above—The 392-ft continuous overhead monorail conveyor passes through the coremaking department where ten blowing stations are located. *Below*—Loaded conveyor racks enter oven from the bottom which provides a natural heat seal while the entire floor space under the oven is utilized for handling of cores



Above—Hoppers at core blowing stations are filled by an overhead sand distribution system. *Below*—Here racks loaded with cores are emerging from the three-pass oven where they have been baked an average of 2 hours at 450°F. Oven is 62 ft long, 21 ft 8 in. wide and is located 9 ft off the coreroom floor

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Left—Clarence Humphrey, coreroom foreman, and Stanley Olson, foundry superintendent, stand at the oven exit. The conveyor makes a complete left turn here going into the cooling zone alongside the oven. *Right*—A portion of the core unloading zone. Racks are conveniently unloaded from both sides of the conveyor

(*Concluded from page* 212)

The coreroom produces cores for Case tractor manifolds, pistons, water jackets, hydraulic pump castings, bottom and top cylinder head jackets and motor blocks, plus miscellaneous tractor and implement cores.

The monorail conveyor system for transporting green cores through the oven is 392 ft long. Carrying racks are loaded from either side, five core blowing stations being located on each side of the conveyor line. The horizontal oven is located overhead (Fig. 3), and the rack enters it from the bottom. This provides a natural heat seal and also gives additional floor space beneath the oven with 9-ft head room.

The oven is 62 ft long, 21 ft 8 in. wide. Cores are baked an average of 2 hours at 450° F. On leaving the baking zone (Fig. 5) the conveyor makes a complete left turn, going into the cooling zone alongside the oven. The racks return to floor level (Fig. 6) for unloading.

Nodular Iron Experiments

(*Continued from page* 99)

for keel blocks, but 0.505-in. diameter test bars were cut from the 1¾-in. diameter sprue; these test bars were centered at half radius to avoid the exact center of the sprue, although the sprue appeared to be perfectly sound. The following properties were obtained on these bars:

	As Cast	Heat Treated (3 hr, 1650° F; Annealed
T.S. psi	95400	78300
Y Pt., psi	59200	.....
Elong. %, 2 in.	1½	6
Red. in area, %	0.4	3.9
Bhn	302	202
Micro-structure	Traces of free ferrite and cementite in matrix of pearlite	Approximately 20% pearlite and 80% ferrite in matrix
Dens. lb/cu in.	.2599	.2572

Final chemical composition of this casting was: Total carbon 3.25 per cent, silicon 2.32, manganese .75, phosphorus .12, sulphur .019, magnesium .059 (20 per cent recovery).

50-50 Ni-Mg—In one experiment, a 0.40 per cent Mg addition failed to give any nodular graphite. The reaction, when the alloy was added, was considered too violent for further experimentation.

80-20 Cu-Mg, and 70-30 Cu-Mg—These alloys were tried in six experiments. The magnesium additions varied from .32 to .75 per cent with and without a prior ferrosilicon addition. Desulphurization procedure was similar to that followed for most of the 80-20 Ni-Mg experiments. In no case was any nodular graphite produced.

34-7 Si-Mg (Balance Mainly Iron)—Table IV shows results obtained in eight experiments using this alloy. A completely nodular structure was obtained in only two experiments; in both of these, the magnesium alloy was preheated to about 900°F and the desulphurized metal poured on top of it.

Figs. 3, 4, and 5 show the microstructure of a heat treated test bar of experiment 29-A.

The results indicate that there may be a critical preheating temperature range of this alloy, for the particular procedure used. However, the excessive temperature loss as a result of the transfer operation brought to a halt any further experimental work on this alloy, pending future developments.

43-9 Si-Mg (Balance Mainly Iron)—Of seven experiments using this alloy, a predominantly nodular structure was obtained in only one; in this one a 0.25 per cent Mg addition was preheated to approximately 900°F before pouring desulphurized metal on top of it. In the other six experiments, the magnesium alloy was either preheated to about 1500°F, or not preheated at all, with completely negative results in all six cases.

Electric Furnace Experiments—One heat consisting of 5400 lb of charcoal pig iron was melted in an acid electric furnace. The only addition made to the furnace was 135 lb of 50 per cent ferrosilicon, so the final weight of metal was actually 5500 lb. This heat was tapped at 2860°F into a 3-ton ladle. Nine and one-half monorail ladle catches were required to empty the 5500 lb, and each was individually treated with magnesium alloy, the slag skimmed, and a final inoculation made with SMZ alloy.

Each of the first two ladles was treated with 6¼ lb of 80-20 Ni-Mg alloy and 2 lb of SMZ, the latter being stirred in. Fracture test specimens ⅜-in. in diameter and 6 in. long were poured from each of these two ladles after treatment, into dry sand cores; the specimens, when broken, indicated that the magnesium recovery was probably on the high side of the desired range, though subsequent analyses disproved this assumption. Consequently, for each of the succeeding seven ladles the 80-20 Ni-Mg alloy was reduced to 5 lb, the SMZ being kept at 2 lb.

(*Continued on page* 216)

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(*Continued from page* 214)

The tenth ladle, containing about 280 lb, was treated with 2¼ lb of 70-30 Cu-Mg alloy and 1 lb of SMZ. This alloy was used mainly for curiosity, as it failed to produce nodular iron when added to cupola metal.

Castings were poured from each ladle, and a keel block was poured from each of the No. 1, 2, 3, 4, 5, 7, 8 and 9 ladles; three keel blocks were poured from the tenth ladle, to which the 70-30 Cu-Mg alloy was added. No test block was poured from ladle No. 6, due to lack of metal after pouring castings. Some of the keel blocks were poured from the first metal of the individual ladles, and some from the last, no record being made of this particular item. Section thicknesses of castings were from ¼ in. up to 3 in.

Table V shows the mechanical properties obtained on this heat, while Table VI shows chemical compositions of samples from five of the ladles.

Hold Manganese Low

It will be noted that for the first two ladles 0.22 per cent Mg was added, and for the next seven ladles only 0.17 per cent Mg. The lowest elongation of the as-cast bars treated with Ni-Mg alloy was 13 per cent, the highest 18 per cent. Of the annealed bars, or those held at 1350°F for 2 hours, the lowest elongation was 16 per cent and highest 22 per cent. It is felt that the as-cast elongations would have been somewhat higher had the manganese content been lower. A 0.30 per cent maximum manganese content was desired, but it was discovered afterward that the actual manganese content of the pig iron was higher than the supplier's analysis showed. There was some pearlite present in the as-cast bars, as shown in Fig. 6. Fig. 7 shows that remnants of pearlite were still present after a 2-hour hold at 1350°F. Fig. 8 shows the as-cast microstructure of a casting which had a uniform section thickness of ¼-in.; a dry sand core was present on one side of this particular section. A somewhat finer nodule structure is apparent in Fig. 8 as compared with Figs. 6 and 7.

Mechanical properties of 0.505-in.-diameter test bars machined from a casting having a 1¼-in. section thickness, in the as-cast and heat treated conditions, were as follows:

	As Cast	Heat Treated (2, hr, 1350° F.)
T.S., psi	85800	72100
Y. Pt., psi	58800	47500
Elong. %, 2 in.	14	20
Red. in area, %	11.5	17.0
Bhn	207	167

Some carbon flotation was evident along the top surfaces of castings

1 in. in thickness and over; this higher carbon layer was quite uniform in thickness, and extended to a depth of 1/16-in. in most cases.

It is interesting to note that the two-bars oil-quenched from 1600°F and tempered at 1200°F had elongations less than the respective as-cast bars, though it is quite possible that a higher tempering temperature would have given higher elongations.

Results of the tenth ladle, in which Cu-Mg alloy was used, are puzzling. First, there were substantial differences in hardness between the surfaces of the keel blocks and the machined test bars; second, annealing had no effect on the tensile strengths or elongations, but did reduce the hardness somewhat.

Many specimens from castings as well as test bars poured with this heat were examined microscopically; none of the specimens showed any flake graphite.

Densities of sections cut from the as-cast and heat treated bars of ladle No. 3 were 0.2557 lb/cu. in. for the as-cast bar and 0.2539 for the heat treated bar.

Summary and Comments—Nodular iron was made using regu'ar production cupola base irons and electric furnace metal. The use of cupola base iron resulted in a predominantly pearlitic matrix as cast, while the electric furnace nodular iron was mainly ferritic as cast.

For the as-cast pearlitic type, properties of 80,000-100,000 psi tensile strength and 1-3 per cent elongation were quite consistently obtained; the indications are definite that with a controlled cooling rate, properties of 80,000-100,000 psi tensile strength and 5-10 per cent elongation, in the heat treated condition, can be obtained without difficulty, after a little more experience with this material.

In the electric furnace heat, using 80-20 Ni-Mg, as-cast properties were 74,800-83,800 psi tensile strength and 13-18 per cent elongation. After annealing, or holding at 1350°F for 2 hours, the tensile strengths were 68,-600-77,700 psi and elongation 16-22 per cent.

The following comments, based on the experiments reported and observations made to date, are offered:

Melting — Referring to the cupola nodular iron portion of this article, it is recognized that the procedure used was not as economical as production treatment would be, wherein the required silicon would be present in the base metal, less desulphurizing agent would be required, the sulphur would be at a lower level, and less magnesium alloy would be necessary.

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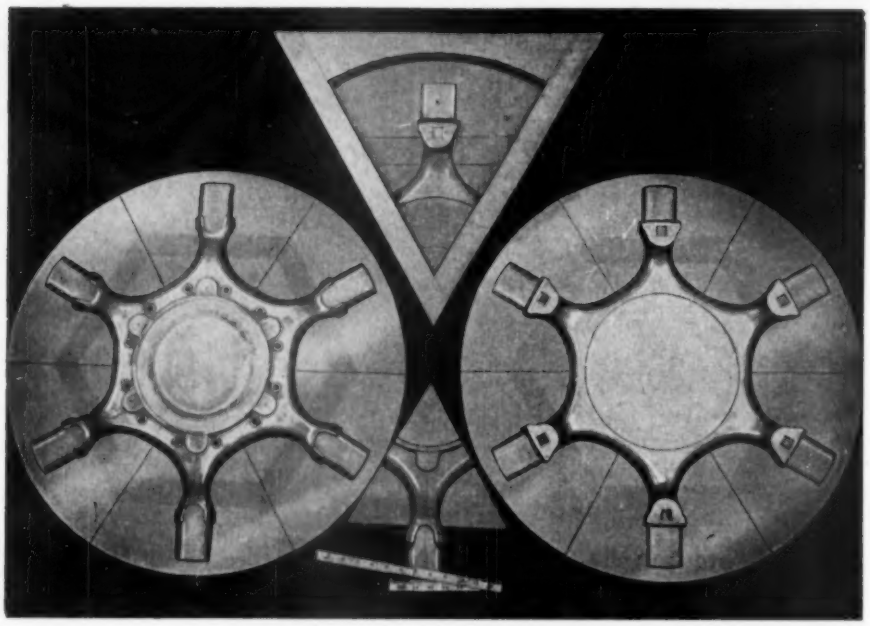

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However, it is felt that this method is a very satisfactory one for purposes of experimentation and production of sample castings, possibly even for small production runs, there being no interference with normal production in the foundry.

Cupola Base Irons, High vs. Low Carbon—No definite conclusions were reached as to the mechanical properties of nodular iron using a 3.55 per cent total carbon base iron compared with those in which a 3.30 per cent total carbon base iron was used.

Nodularizing Alloy—Of the alloys used, the 80-20 Ni-Mg alloy gave the most consistent results. The Cu-Mg alloys failed to give a nodular structure when added to the cupola irons, yet did produce a completely nodular structure when added to electric furnace metal. The Si-Mg alloys used gave inconsistent results.

Liquid Shrinkage — There seemed to be somewhat less shrinkage of cupola nodular iron when the higher carbon (3.55 per cent) base iron was used, as compared with that using the lower carbon (3.30 per cent) base iron. However, sound castings were obtained with the 3.30 per cent total carbon base iron when good risering methods were followed, with satisfactory yields.

Pinholes — Few of the cupola or electric furnace nodular iron castings made showed pinholes. When the metal was too cold at the time of inoculation, or a large amount of inoculant was used, or both, pinholes were encountered. The writer believes that metal temperature at the time of inoculation, and amount of inoculant added, are the most important factors with respect to pinhole formation.

Inspection—The matter of inspection of nodular iron is considered to be extremely important. It is imperative that a casting designed in nodular iron not turn out to be gray iron, when checked by the customer or upon breakage in service. Fortunately, experience to date indicates several methods of detecting castings having even small amounts of flake graphite. At this time, the best of these seems to be a visual inspection of the fracture upon breaking of the gates and risers.

Carbon Analyses — Total carbon analyses using regular drilled samples resulted in low values. After much experimentation, either of the following two methods of sampling gave consistent and, what are believed to be, accurate total carbon analyses: 1. Use of a solid sample about 1/32-in. in thickness, cut with

(*Concluded on page* 220)

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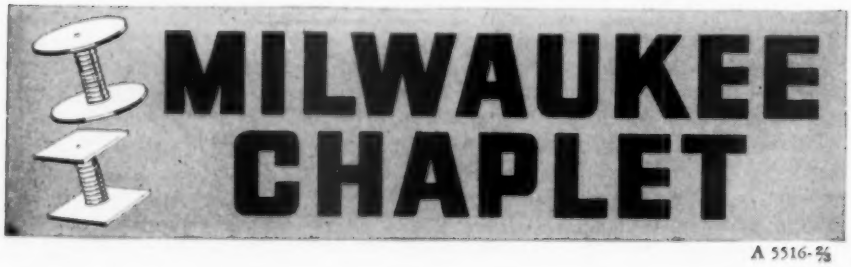

A 5516-⅔

(*Concluded from page* 218)

a hack saw. 2. Use of the entire drilled sample, drilled with a 1/16-in. diameter drill.

Machinability — Machinability of the cupola nodular irons seemed very definitely superior to that of gray irons of the same hardness.

Test Bar Fractures — It was observed that the fractures of the heat treated electric furnace test bars treated with 80-20 Ni-Mg alloy varied from partially dark gray to almost completely dark gray, though no flake graphite was present. The greater the elongation the greater was the dark area. All other bars had so-called "steely" fractures.

Potentialities—Many sample castings were produced during the course of these experiments, and the castings are now undergoing various tests.

Essentially, the writer sees only two distinct types of nodular iron: Ferritic and pearlitic, each having its own applications. Under each of these types come as-cast and heat treated classifications.

While the writer is quite enthusiastic concerning the potentialities of nodular iron, he believes that conversion of appropriate gray iron, malleable, and steel castings should proceed in a slow and orderly manner, and only after thorough consideration of service conditions, weight-saving possibilities, machinability requirements, and ultimate cost.

The design of a new part to be made of nodular iron, or one to be converted from present materials to nodular iron, calls for the utmost in "materials engineering."

Acknowledgment — The writer is indebted to D. P. Forbes and P. A. Paulson, president and chief metallurgist, respectively, Gunite Foundries Corp., for many helpful suggestions given during the course of the foregoing experiments.

Book Review

Proceedings of The Institute of British Foundrymen, Vol. XLII, 1949, cloth; 414 pages 7 x 9¾ in., edited by George Lambert, assistant secretary IBF, and published by Institute of British Foundrymen, Saint John Street Chambers, Deansgate, Manchester.

This volume contains the papers and ensuing discussion presented at the 46th annual general meeting of the institute at Cheltenham, June 14-17, 1949; also a selection of the papers presented at various branch meetings during the session 1948-49. The frontispiece presents reproduction of a

photo and brief biographical sketch of the 1949-50 president, Noel P. Newman. Mr. Newman attended the recent AFS convention and exhibition in Cleveland, May 8-12.

Other features include a list of past presidents of the institute, present members of the council, branch presidents and secretaries; recipients of the Oliver Stubbs gold medal; E. J. Fox gold medal; British Foundry medal; Meritorious Service medal; diplomas of the institute and a list of the Edward Williams lectures from 1935 to 1949.

Gray Iron Society Receives Award

Gray Iron Founders' Society, Cleveland, national trade association of the gray iron foundry industry, was honored at the annual meeting of the American Trade Association Executives, Washington, with the award of a certificate of merit for distinguished service by trade associations. The award is presented annually for outstanding accomplishment to national state or local trade associations.

Presentation of the plaque was made by Reuel Elton, general manager of the American Trade Association Executives, to H. L. Edinger, vice president of the Gray Iron Founders' Society, on Sept. 27, at Hotel Somerset, Boston.

Book Review

ASTM Standards on Copper and Copper Alloys-1949, paper, 496 pages, 6 x 9 in., published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $4.35.

This latest edition as of December, 1949, brings together in convenient form 105 ASTM standards pertaining to copper and copper-base alloy products which were developed by Committee B-5 on Copper and Copper Alloys, Cast and Wrought, and other technical committees. Divided into nine sections the first relates to copper, copper alloy, and copper-covered steel wire, rods, bars, and stranded conductors for electrical purposes. Second covers nonferrous metals, while the third deals with copper and copper alloy plate, sheet and strip. Fourth contains standards on copper and copper alloy wire rods, bars and shapes, and the fifth those on pipes and tubes. Sixth pertains to copper alloy ingot for sand castings, and the seventh relates to copper alloy castings. Remaining sections are on arc-welding electrodes and methods of testing.

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Adventures of BILL

By PAT DWYER
Drawings by RICHEY

ON the mezzanine floor of a local hotel recently, Bill and I spent a soothing, peaceful and nostalgic hour viewing an extensive collection of antiques ranging from buttons, candlesticks and tin lanterns, to porcelain and precious metal objects. A display which captured our breathless attention, featured a collection of literary masterpieces from the old carefree boyhood days, *The Log Cabin Library, The War Library, Beadle's Dime and Half Dime Library,* and *The Detective Library.*

Merely as an expression of opinion and without attempting in the least to influence the reader's opinion in his or her choice of literature, I feel that I am entirely within the bounds of truth when I say that Old King Brady furnished more thrills per page than any other hero of fiction within my recollection. 'Tis true he flourished in the days before automatics were invented and he never had seen or used a telephone or an automobile; but he never failed to bring in his man, sometimes dead, sometimes alive, but he brought him in and on each occasion cleared up one of the most baffling mysteries that ever confronted the New York police department.

He never shot except under the most severe provocation. Bullets might bury themselves in the walls and splinter the woodwork all around him without disturbing his equanimity or altering his determination to capture the villians alive. However, when a bullet carried away his famous old gray hat, he always decided the time for severe and drastic measures had arrived. The human eye could not follow the lightning rapidity of his movements. Where a moment before an apparently unarmed, defenseless old man occupied the doorway, there now stood a grim figure with death and destruction leaping in a living flame from a heavy revolver held in each hand. At every crack a miscreant bit the dust, irrespective of whether he fell backward or forward. Having examined each one and satisfied himself that he had driven the bullet fair and true midway between the eyes in each case, he hastily removed the diamonds or the documents from the inner pocket of the leader. After reloading his weapons and returning them to their secret hiding places on his person, he blew his silver whistle and summoned the police patrol to cart the carrion to the morgue.

"Talking about detectives and mysteries and one thing and another," Bill said, "I had an inquiry recently from a foundryman who had a mystery that would have taxed the ingenuity of Old King Brady, himself. Give a lissen vunce, as they say over in certain sections of Pennsylvania, and I shall read it to you."

I shall appreciate an expression of opinion on a recent rather remarkable occurrence in our gray iron foundry. From your extensive foundry experience I feel reasonably sure you can suggest an answer to what, up to the present, is a real mystery. The cupola had been in operation for about an hour and the final charge was a few feet below the charging door, when a violent explosion caused the stack to topple over at the roof level and break into two sections. The stack and lining are constricted gradually from above the charging door to the roof line. Above the roof the stack is appreciably less in diameter than the lower, or main part of the cupola.

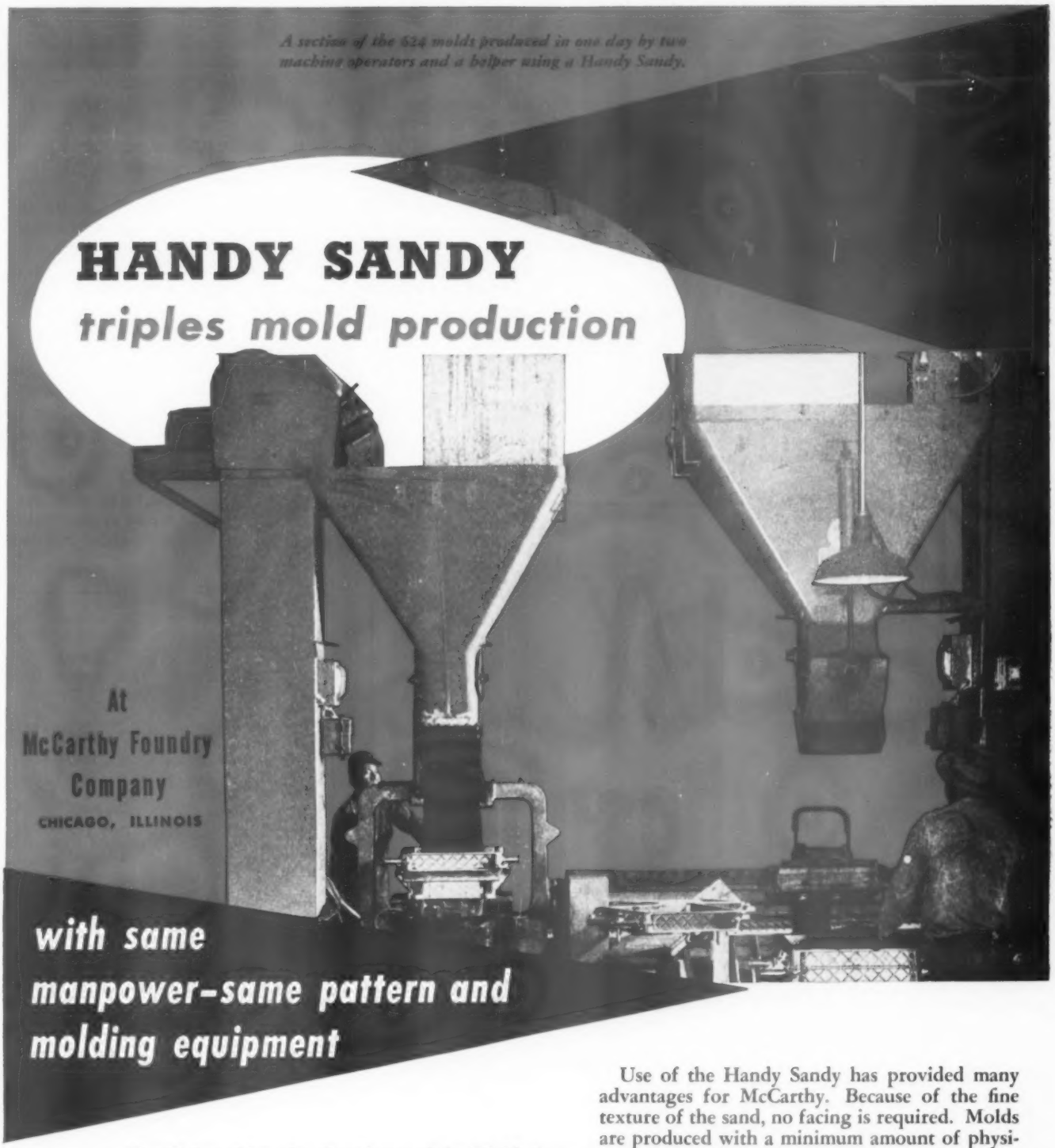
A month before the accident the cupola had been lined with 6-in. blocks. Steel construction experts claim the shell was sound and showed no sign of overheating or any other form of deterioration. The assistant works manager of an engineering company in a neighboring city was in the foundry yard at the time of the accident. I am enclosing a copy of his observations. Opinion around here is that gas trapped beneath the conical cap on top of the cupola was responsible. Are you familiar with any similar instances?

Report from the assistant works manager follows, slightly abridged.

From where I stood I could see that the stack was operating in a normal manner. Suddenly a high, white flame 25 to 30 ft high flashed from the top of the stack. As the long flame died, the stack came together at the point where it emerges through the roof. With the fulcrum at the roof line, the stack tipped over. At an angle of approximately 30 degrees from the perpendicular the stack buckled and fell in two pieces of equal length. Pieces of slate and boards flew in the air, also a cloud

(*Continued on page* 224)

For ways that are dark and for tricks that are vain, the foundry cupola takes the jolly old cake



A section of the 624 molds produced in one day by two machine operators and a helper using a Handy Sandy.

HANDY SANDY

triples mold production

At McCarthy Foundry Company
CHICAGO, ILLINOIS

with same manpower–same pattern and molding equipment

Simply by taking the shovel out of the Molder's hand and replacing it with a Handy Sandy, McCarthy Foundry tripled their mold production. They still use the same pattern and molding equipment. Yet two machine operators and a helper have produced 624 molds in a single day using the Handy Sandy . . . compared to a maximum of 200 molds when filling the flasks by shoveling. This production is obtained on molds using a 20″ x 20″ pop-off flask. They have a mold height of 10″ with a 6″ cope and a 4″ drag.

Use of the Handy Sandy has provided many advantages for McCarthy. Because of the fine texture of the sand, no facing is required. Molds are produced with a minimum amount of physical effort. The increase in production has made possible faster deliveries — a factor that has won new business for McCarthy and has improved their service to present customers as well.

Yes, the Handy Sandy eliminates "shovel-fatigue" and lets the molder devote full time to producing molds. Your investment in equipment and labor brings you a greater return.

See how the Handy Sandy can multiply your mold production and save you costly expenditures for new patterns, manpower and molding equipment. Write today for complete details.

NEWAYGO | ENGINEERING COMPANY

NEWAYGO, MICHIGAN

Manufacturers of Neway Mold Handling, Sand Handling and Conditioning Equipment.

(*Continued from page* 222)

of dust, sparks and flame. The flame continued to shoot from the shortened cupola for a few moments.

Based on 31-years' experience in the foundry industry, including the construction, operation and maintenance of the cupola, it is my honest and unbiased opinion that the explosion occurred above the charging door and that the resulting vacuum had permitted the upper part of the stack to topple over. This opinion is substantiated by the long white flame that showed at the top of the stack before it toppled. Also the charging door had remained closed throughout the entire episode.

"Quite an episode," I admitted. "Did you have anything of a similar character to dredge out of the old memory bag?"

"Well," said Bill, "I'll tell you. I have seen so many queer things happen to cu-bill-os that nothing surprises me any more. The name constantly is mispronounced, not only by the terriers in the shop who handle the English language as carelessly as—well—as they handle everything, but also by those who move in the upper stratas and who know how to read and spell. In this connection I sometimes wonder why some daring character does not suggest that the ASTM add a clause or something to the multitudinous book of specifications, officially changing the spelling of the word from 'cupola' to the universal and popular 'cubilo,' with a rousing accent on the last letter!"

"What has all that to do with the cupola that blew up and fell down? What did you write the honest man, presumably keeping a lonely vigil, shading the eyes with one hand, and watching for the pony express rider to dash up with the burning message, or did you take refuge in the familiar standard: 'Your very interesting question of the 13th prox will receive our very earnest consideration. Glad to hear from you, old man. How are the Missis and the kids?' "

"As a true friend and well wisher, my dear young fella, I suggest that you stay away as far as possible from all forms of quiz programs. All you would hear would be the gong and the imitation regretful voice of the quiz master 'O, I am so-rry, the name of the man buried in Grant's tomb is Grant.' You should stick to the simple stuff like cards and tea-leaf readings. Go play with your kiddy car and leave the mind-reading business to those who have progressed beyond the kindergarten. For your general information I wrote a fairly long epistle. Listen my lad and you shall know just what happened inside the cubilow."

An incident in the day's work

"If that is a fair example of the kind of doggerel in which the note was written, you can count me out. I can be pushed just so far."

"No one around here pushing you. Settle back into your little nest and listen:

Ajax phosphor copper,

like all Ajax alloys, is produced under rigid laboratory standards to constant formulae. In relation to total cost, Ajax alloys give greater performance. No product can do more . . . so protect your quality work with Ajax alloys.

AJAX METAL DIVISION of H. KRAMER & CO.
PHILADELPHIA 23, PA.

Dear Mr. (You will pardon me for not mentioning the name): As you very kindly point out, I have been more or less intimately acquainted with foundry cupolas here and there for many years. Le's see, from 1891 to 1950, or approximately 59 years. You probably will be saying to yourself 'It's about time you quit.' Presumably you are familiar with one of the foundry's oldest traditions 'Old molders never die. They live practically forever and then just vanish!' This suggests another saying 'No one ever saw a dead molder, a dead donkey or a dead'—O well if you heard the remark you may fill in the gap. If thus far you have lived in innocence, I should be the last man in the world to sully your ears.

Touching on your recent catastrophe, I must admit that despite my extended experience I never have seen a wrecked cupola. I have seen cupolas torn down deliberately. I have seen a few moved intact from one site to another, and I have seen a few that looked as if they would fall down if the cupola tender wiggled the tapping bar in the breast opening. All the Leaning Towers in the world are not in Pisa. If I did not know foundrymen so well I might be tempted to believe that the old cripple cupolas were maintained in an upright position by earnest daily prayer and the grace of God.

From the foregoing you readily will gather that I am not in position to offer a positive or dogmatic opinion. However, your description and the comment of the assistant works manager who witnessed the spectacle bring to mind a comment from the late R. E. Masters, presented many years ago in THE FOUNDRY. If you care to look it up the date was Sept. 15, 1925 and the page was 726. Mr. Masters had an experience somewhat similar to yours while he managed the old Tredegar plant in Richmond, Va.

Gleaners working over Civil War battlefields in the vicinity of Richmond, carted the miscellaneous material to the Tredegar scrap yard. Some men made a regular business of this activity. Young colored gents lacking the coin and suffering from drouth, occasionally gathered small quantities.

Scrap collected in the field and delivered to the Tredegar yard included globular 6 and 8-in. cast iron shells. The majority were duds, but anticipating possible trouble, Mr. Masters insisted on a strict inspection before the shells reached the charging floor. One day a loaded shell got by the inspection and was thrown into the cupola. The resulting explosion did not wreck the cupola as completely as your's was wrecked, but the damage was plenty.

In view of the foregoing and your description of the incident, a large white flame shooting out of the top of the cupola 25 to 30 ft, and the break at the point where the diameter of shell and lining was constricted, I am inclined to the opinion that a loaded shell of some kind was included in the charge.

No evidence is presented to show whether the deed was deliberate, or due to ignorance, accident or carelessness. In your place I should be inclined to do a bit of investigating. In all probability you are not old enough to remember the actual deeds of violence, but without doubt you are familiar with the history 1854-1877 of the reign of terror inspired by the infamous, hooded and masked Mollie McGuires in the anthracite coal regions of Pennsylvania.

"To refresh the memory of your foundry friend," I said, "you might have referred him to a bulky volume *The Pinkertons and The Molly McGuires*, a detailed history of the society, its dark and blood-stained activities and the final smash-up. The book was written by Allen Pinkerton, head of the famous detective agency. The cover was ornamented by the well known emblem, a wide open eye and the motto 'We Never Sleep.'

"Nothing in modern fiction, or in the mythical adventures of mythical and more or less moronic heroes in the so-called modern comic books, equals the career of James McParlan, Pinkerton operator in his four year's connection, 1873 to 1877, with the order. He became a member in 1873 and in a short time became secretary of one of the lodges. His iron nerve, courage, mental ingenuity and resourcefulness carried him through

Photo at left: A cross section of unit showing discharge pipe (A), induction channel where pressure is created (B), pouring spout (C), and mold (D).

The large photo shows the Ajax-Tama Electromagnetic Pump at work. Control cubicle in rear maintains temperature, energizes pump from electric timer, electric eye, or similar devices.
Photo at right: Closeup of the pumping unit.

THE AJAX ELECTROMAGNETIC MOLTEN METAL PUMP*

The Ajax-Tama Electromagnetic Pump is used in "around-the-clock" operations at the assembly lines of a number of prominent plants in the United States for the mass production of high precision aluminum alloy castings.

Using electromagnetic pressure created by high current in the loop of an Ajax Twin Coil Unit, the molten metal is automatically controlled and channeled in one direction. From the bottom of the hearth (see cross section drawing) through an electrically heated refractory pipe, the pure metal is lifted to the mold. The flow is completely controlled by electric current.

Maintaining excellent weight accuracy, castings of from ¼ to 30 pounds, or more, can be poured in continuous operation. Special problems calling for a flow of hundreds of pounds per minute can also be handled by this same unit. The electromagnetic pump can be used as a reservoir to maintain molten metal at constant, accurate temperatures . . . for complete information contact Ajax.

* Patents applied for and allowed.

AJAX ENGINEERING CORPORATION
Trenton 7, N. J.

AJAX TAMA-WYATT INDUCTION MELTING FURNACE

AJAX ELECTRO METALLURGICAL CORP., and Associated Companies
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

heart-chilling and apparently incredible experiences.

"Bit by bit, and at constant risk of his life with a band of suspicious, unprincipled and ruthless men, he built up a chain of evidence that eventually resulted in the arrest, conviction, execution or imprisonment of all the prominent members and the disbandment of the society."

"Shamus was quite a lad," Bill commented. "Too bad he is not on the job today. There are several dark corners in this broad land that would bear looking into!"

Large Sculpture Group Cast In Aluminum

(*Continued from page* 105)

segments, this piece was roman jointed in the mold to be free from the torso when chipped. This segment was added to the uppermost part of the hips-down section still in work in plastelene. It was accurately set in place by points taken from its former home, the backboard of the torso section. Since formerly it was an actual part of the torso pattern, and since it contained a male joint which accurately fitted with the shipped section, the problem was solved. Alignment was taken care of by the points from the backboard, and positive fit assured by the roman joints.

With the hips down section completed in plastelene, the false segment at the top was shellacked and greased, and then molded with the remainder of the section. Since the impression became an integral part of the mold of this leg section, the false segment now could be eliminated. It would be reproduced as part of the hips-down pattern when the mold was filled to form the pattern, male joint and all.

As an additional aid in the foundry, Williams supplied a background ledge or shelf, about 4 in. wide, extending outward from the edges of each piece. The ledge eventually would seat against the wall of the building. In this way an adequate flush line was provided in advance, so that little grinding would be necessary to flush-seat the group against the stone face of the building.

Use Lost Wax Method

The foundry method selected for reproduction was the cire perdu, or lost wax process. Basically, this process consists of forming a wax impression of the pattern segments, making a core within each of the images, and covering the positive faces of the images with a given thickness of plastic refractory material.

Positioning of the casing to the core is assured by nails driven partially through the wax image into the core. As the wax copy is covered with the refractory material, the sculptural impression automatically is transferred to the inner surface of the outer casing. When this impression has been taken from the wax by the refractory casing material, the wax impression becomes worthless. The next step is to remove the wax. It can be melted out and that is the basic feature of the lost wax process.

The entire assembly—core, wax and casing—is enclosed in a temporary oven or kiln and raised to a comparatively high temperature, approximately 1000° F, for a given length of time depending on the size, shape and total volume. The wax melts and runs out through an escape hole or holes at the bottom of the assembly. Some of the wax is recovered; the remainder evaporates. The wax-free mold is removed from the kiln and placed in a pit in the floor or in a suitable metal flask

Here's Your

LIGHT WEIGHT PORTABLE MULLER!

- Diameter of shell—12"
- Overall height—13½"

CINCINNATI MULLER
(Patent Applied For)

CHECK THESE FEATURES!

- Portable — weighs only 85 lbs.
- Simple, compact efficient design.
- Only 2 moving assemblies, Mullers and Scrapers.
- Hardened steel Scrapers—removable and replaceable.
- Easily cleaned and re-assembled—no tools needed.
- Surprisingly low in price.

FOR MIXING SAND IN SMALL QUANTITIES

Your foundry has long needed a Muller of this size. And here it is! Handles mixes up to 7 pounds. Weighs only 85 pounds, so it is easily portable!

The Cincinnati Muller can be used efficiently for laboratory testing of core sand mixes, facing sand mixes and moulding sand mixes. It is also satisfactory for production runs of small quantities of core sand. A Spacer is supplied to lift the Mullers from direct contact with the steel plate — particularly desirable in analyzing moulding sands.

There is nothing on the market today that compares with the Cincinnati Muller. And its price is *surprisingly* low! Write today for complete information.

Easily Cleaned and Re-Assembled — No Tools Needed

Manufactured for

BP **THE BUCKEYE PRODUCTS CO.**
7029 VINE STREET CINCINNATI 16, OHIO
Manufacturers of Core Oil • Parting • Core Compounds
Core Wash • Refractory Cements

where sand is packed tightly around it. Later the molten metal is poured into the mold to fill the space formerly occupied by the wax.

With the "Venus and Manhattan" group the procedure was as follows: The various segments of the plaster group were completely dried out and the faces covered with a mixture of shellac and alcohol. This coating was designed to kill the porosity of the plaster and to provide a protective coating for the segment surfaces. Each part was covered with a layer of clay in thickness to correspond to the desired ultimate thickness of the glue mold to be formed over it. After suitable pouring and air-escape vents were modeled on the clay surface, the whole object was covered with plaster of paris to form the shell to hold the glue. When this plaster shell or casing had set, it was taken off, the clay removed from the pattern and the surfaces of shell and pattern carefully cleaned. Once the shell had completely dried, the inner surface was shellacked. When this had dried, the inner surfaces of shell and pattern were greased carefully with a mixture of stearin and kerosene.

With the shell again replaced over the pattern in precisely the original position, it was fastened down firmly with plaster and burlap ties. The warm liquid glue then was introduced through the pouring vent to fill the space formerly occupied by the clay. As the glue reached the various levels of the air vents, the openings were closed to prevent overrunning.

Remove Glue Coat

The following morning the casing was removed. The wobbly glue impression gently was taken off the pattern and placed in its backbone, the plaster casing. Immediately the impression bearing surface of the glue mold was dusted with soapstone to kill the grease picked up from the pattern surface. The surface was coated twice with a saturated solution of alum and water, which also contained a few drops of formaldehyde as a preservative.

After the second alum coat had dried, the surface was given a light greasing with vegetable oil and then was coated meticulously with a fine-grade beeswax, brushed in until a satisfactory three-coat thickness was obtained. Following this a coarser grade wax was poured into the mold and rolled within the cavity until the final thickness—¼-in. minimum, the desired metal thickness of the aluminum—was achieved.

The cavity now remaining was packed solid with a freshly mixed

cuts materials-handling costs

Now you can safely haul over ½-ton loads with one-man economy. Kwik-Mix *fully-powered* Moto-Bug carries up to 1200 lbs. on sturdy, 4-ft. flat-bed platform . . . makes more trips per hour because power does all the hard work. Operator rides on back step . . . has positive steer for easy spotting, reverse power for back-up. No pushing, *no pulling*. Moto-Bug travels 1½ to 4 m.p.h. forward *and reverse*, easily takes full load up 20% ramps. Quickly pays for itself in more production per man-hour. Platform has stake pockets for side-boards . . . tilts for easy pull-away when unloading. Positive steer, plus handy 33" width, gives quick maneuverability in crowded aisles and narrow doorways . . . turns around in own length. Interchangeability from flat-bed to 12 cu. ft. hopper extends Moto-Bug economies to handling foundry sand, coke, scrap, concrete, and other bulk materials. Big-capacity hopper (below) has low loading height, instantaneous gravity dump, and handy rope control for partial load discharge at any time.

Standard-make, 4 h.p., 4-cycle gasoline engine packs plenty of power to carry heaped loads over soft footing. Dual steering wheels, and choice of big single or dual drive tires assure ample load flotation, traction, and handling ease on or off pavement, anywhere around shop or factory yard. All these Moto-Bug advantages add up to easier materials-handling, more output per man-hour, and lower costs *FOR YOU.*

KM28 REV.

Mail Now to: KWIK-MIX COMPANY, PORT WASHINGTON, WIS.

Send us more facts on low-cost Moto-Bug with: ☐ 10 cu. ft. hopper ☐ 1200 lb. flat-bed ☐ fork lift

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STREET _____

CITY _____ STATE _____ FO

KWIK-MIX COMPANY
PORT WASHINGTON, WIS.
(Koehring Subsidiary)

batch of 50-50 silica and plaster. With this set, the glue mold was removed and set aside. The glue mold and casing had no further value.

Williams visited the foundry regularly. As each successive wax impression was removed from its respective glue mold, he did what retouching was necessary, and then turned the image over to the workmen. At this stage all circumference edges of contact were built up with a thin ribbon of excess wax in preparation for cold hammering the final joints.

The surface of the wax image was peppered with a crazy-quilt design of square-head nails driven part way through the surface into the plaster-silica core. Vents and risers were formed in wax, and attached to the image at necessary points, to provide for accurate and rapid distribution of the aluminum, and for escape of gases. An opening was provided at the top for receiving the metal from the crucible, and an escape hole for the wax at the bottom.

The entire wax segment, with outjutting nail heads, was covered with a coating of the plaster-silica mixture to form the outer shell or "mummy case." After a sufficient drying period the assembly was placed in a brick kiln built specifically for the purpose. With all the wax removed, the assembly, empty between casing and core, was removed and placed in a pit in the floor, or in a suitable flask as mentioned previously. Reinforcing sand was rammed in the space between mold and pit or flask walls. The mold then was filled with molten aluminum.

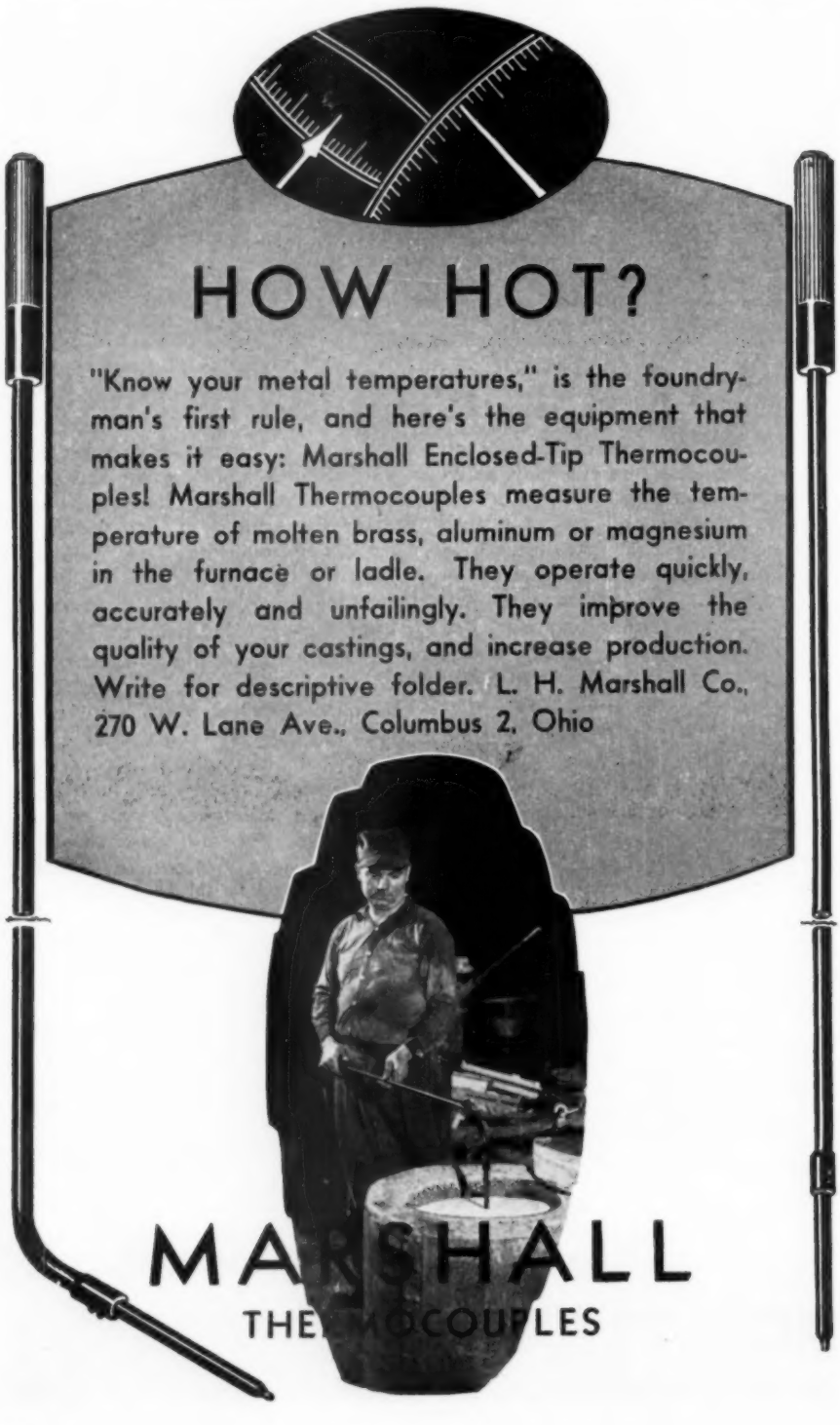
After the casting had cooled, the casing and core were broken away and the casting was turned over to the foundry chasing department for removal of vents, gates and risers, filling in of nail holes and any other surface retouching. This work was carried on under the personal supervision of the sculptor.

As fast as chasing was completed, the various castings were bolted together at strategic points through the internal roman joints. The slightly raised seams were cold hammered and scraped to present a uniform surface.

No surface welding was done on any part of the group, thus eliminating the necessity and difficulty of matching welded areas to the surface of sculpture, and the problem of maintaining uniform color tone in the welded areas.

A total of 1400 lb of Alcoa Alloy No. 43 was melted for the job. The final assembly weighed approximately 1200 lb.

For fastening the group to the building, aluminum cross bars were welded across the back and then reinforced from the outside by countersunk dowels for added security. Penetrating the cross bars, and touching the backs of the figures, seven aluminum bolts were not only welded at the figure and at the cross bar, but also were secured in place by threaded dowels. The bolts passed through suitable bolt holes in the wall of the building. No major difficulty was encountered in mounting the assembly, or in fastening it securely in place.


HOW HOT?
"Know your metal temperatures," is the foundryman's first rule, and here's the equipment that makes it easy: Marshall Enclosed-Tip Thermocouples! Marshall Thermocouples measure the temperature of molten brass, aluminum or magnesium in the furnace or ladle. They operate quickly, accurately and unfailingly. They improve the quality of your castings, and increase production. Write for descriptive folder. L. H. Marshall Co., 270 W. Lane Ave., Columbus 2, Ohio
MARSHALL
THERMOCOUPLES

Booklet Deals With Company Operations

Union Malleable Mfg. Co., Ashland, O., has published a booklet outlining its history, its policies, the operation of its various departments, and describing the products made by the parent company and its subsidiaries, Ashland Malleable Iron Co. and Union Brass & Copper Co., all of Ashland.

Foundry Products Win Arts Awards

Castings and patterns were prominent entries and won numerous awards in the 1950 Industrial Arts Awards program sponsored by Ford Motor Co., Dearborn, Mich. In the competition embracing woodwork, metalwork, mechanical drawing printing, model making, plastics, machine shop and electrical work, cash prizes totaling $13,000 were awarded Aug. 6 to 467 junior and senior high school students of the nation, these being top entrants in a field of 2340 students.

Announcement of the winners' names preceded formal opening Aug. 7 of the Industrial Arts Fair in the Chicago Museum of Science and Industry. Benson Ford, vice president, Ford Motor Co., and general manager of the Lincoln-Mercury Division, represented the sponsoring company at the ceremonies.

Edwin Nickel, Chicago, Lane Technical High school student, won a $50 award for his entry —a cast bronze Cope Cod lighter

Student participation in the 1950 program, first to be sponsored by Ford, was more than double that of any previous year. Entries were received from 39 states, District of Columbia, and Hawaii.

The program was open to students in industrial arts and vocational classes in all schools from grades 7 through 12. It was stipulated that entries would be regular class projects made in school shops under supervision of an instructor. Judging by a committee of 27 leaders in industrial education was conducted in eight general divisions and 19 classifications. Entrants were grouped by grade level and according to the classroom time devoted to the industrial arts subject.

First prize in each age group within the various classifications was $100; second $50; and third $25. Honorable mention awards were $10 each, with six being made in each group.

Book Review

Symposium on Evaluation Tests for Stainless Steels, paper, 231 pages, 6 x 9 inches, published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $2.50.

This symposium, held under the auspices of Committee A-10 on Iron-Chromium-Nickel and Related Alloys, presents a critical appraisal of some of the testing methods in regular use for evaluating certain corrosion-resistant characteristics of stainless steel alloys. It contains 10 papers with discussions which deal with significance of results of laboratory evaluation tests with relation to practical experience under diverse conditions, and the effects of behavior of the alloys in test and in use, of lowering carbon contents to extremely low limits.

SAVE TIME

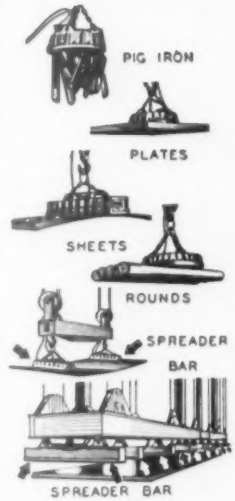
You can cut down the time for loading, unloading and moving hard to handle materials . . . and make a direct saving of hand labor. Whatever your job, STEARNS Lifting Magnets will help you save time and money.

Stearns LIFTING MAGNETS

STEARNS Lifting Magnets are being successfully and profitably used in handling scrap iron, steel plates, coils, bundles, strip steel, rails, slabs, billets, pig iron, castings, borings, turnings as well as finished products. The problem of loading or unloading . . . or moving large quantities of material quickly at a low cost — easily solved with STEARNS Lifting Magnets.

For the efficient handling of flat steel sheets, plates and regularly shaped steel bars and structural steel sections, be sure to investigate STEARNS Rectangular Lifting Magnets.

STEARNS Lifting Magnets pay for themselves in a short time, require surprisingly little attention, and are your best bet for economical, fast and safe moving of material.



Standard sizes available in both bolted and all welded constructions. Special sizes and shapes made to your requirements.

Stearns MAGNETIC MANUFACTURING CO.

662 S. 20TH ST., MILWAUKEE 15, WIS.

Mobilization Plan for Malleable Iron Industry

(*Continued from page* 100)

Hillsgrove, R. I., (2) Fort Pitt Malleable Iron Co., McKees Rocks, Pa.; and (3) the Auburn, N. Y., plant of International Harvester Co. No exact figure is available as to the capacity of these plants, but if they were reopened and properly equipped, they could probably produce about 20,000 tons per year.

Other companies have engaged in rather extensive modernization and mechanization programs. No exact figures are available as to the increased capacity of the industry now as compared with 1942, but 100,000 tons is a conservative estimate.

The survey also solicited information as to total material and manpower requirements for production of 1,195,681 tons of castings. The totals reported are:

MATERIALS

Pig iron (malleable)	373,137 tons
Pig iron (foundry)	34,375 tons
Pig iron (silvery)	118,021 tons
Scrap iron (malleable)	391,463 tons
Steel scrap	628,071 tons
Coal (for heating)	354,172 tons
Coal (metallurgical)	558,721 tons
Metallurgical coke	260,949 tons
Fuel oil	22,349,968 gal
Natural gas	4,819,684,000 cu ft
Ferromanganese (80%)	11,844 tons
Ferrosilicon (50%)	15,089 tons
Sidewall brick	9,128,110 pieces
Bottom brick	2,922,966 pieces
Bung brick	3,070,305 pieces
Cupola brick	2,983,735 pieces
Shot and grit	19,190,739 lb

Note: Many of the companies reported the need for other critical materials, including core oil, linseed oil, lumber, pattern aluminum, nails, wire and rods, seacoal, sand and refractory clays, acetylene and oxygen gas, annealing pots and heat resistant alloy containers.

MANPOWER

Total number of employees required for operation at capacity rate: 40,923, including 32,469 production workers. Of the production workers 6699 are molders, 2463 coremakers and 759 patternmakers.

It will be noted from the table of production that the highest rate ever attained by the industry was in 1941 (972,238 tons), whereas production in 1943 and 1944 dropped to 844,639 tons and 878,233 tons. The inability of the industry to produce at full capacity during those important war years can be directly attributed to a lack of adequate manpower.

On Aug. 1, 1950, the Secretary of Commerce issued a "Tentative List of Essential Activities." Castings are expressly identified under "Major Group 33 . . . Primary Metal Industries."

On Aug. 3, 1950, the Secretary of Labor issued a list of critical occupations which was prepared for the use of the Department of Defense in expanding the armed forces. Metallurgists and certain other technical employees needed in the foundry would come under the definitions set forth in Part I of the secretary's list entitled "Professional and Related Occupations." Molders, coremakers, millwrights, patternmakers and foremen (critical occupations only) and maintenance mechanics are listed under "Skilled Occupations."

Suggestions for Military Preparedness—In meeting with representatives of the Munitions Board, the committee was asked this question, "What method do you recommend we use at this time to give us the best estimate of requirements for malleable castings during the future emergency?" The answer is that there is just no conceivable way to calculate the amount of castings required until an estimate is made of the end use product to be manufactured. In other words, if the industry can be furnished estimates as to the number of combat vehicles or railroad cars or other articles which may be required, we then can estimate the number and weight of malleable castings needed for that given number of end items.

At one conference with representatives of the Munitions Board, it was suggested to the committee that an effort be made to develop a "correlation" between total tonnage of malleable castings and some other basic article such as "total steel production" or "railroad rolling stock."

The only available statistics as to the tonnages produced each year for various end uses are those compiled by the Malleable Founders' Society, the industry's trade association. Seventy-one companies in the United States belong to the Society and these companies produce 75 per cent of all the malleable tonnage produced in the United States. The following breakdown shows the tons produced in ten classifications in 1948 and 1949:

	1948	1949
Automotive (passenger cars only)	212,126 (30.2%)	218,620 (40.2%)
Trucks, truck-tractors, trailers	157,827 (22.5%)	118,520 (21.8%)
Automotive accessories	15,585 (2.2%)	9,578 (1.8%)
Railroad (jobbing and specialties)	56,776 (8.1%)	26,918 (5.0%)
Agricultural implements (including farm tractors)	61,765 (8.8%)	42,734 (7.9%)
Chain	18,928 (2.7%)	14,195 (2.6%)
Electrical fittings and parts	20,068 (2.9%)	15,232 (2.8%)
Pipe fittings and parts	39,241 (5.6%)	24,773 (4.6%)
Plumbing and heating parts	7,853 (1.1%)	4,400 (.8%)
All other types	111,253 (15.9%)	68,058 (12.5%)
Total	701,422 (100.0%)	543,028 (100.0%)

The following figures showing the production of pearlitic malleable iron by Society member companies may also be of interest:

1945	27,401 tons
1946	23,521
1947	32,802
1948	39,632
1949	32,857

Pearlitic tonnage figures are included in the yearly figures for 1948 and 1949 above.

In determining the raw material requirements of the malleable industry, account must be taken of the fact that for certain types of plant and production, direct melting in reverberatory air furnaces is effectively employed, whereas for other plant types and production, duplex melting is required. Direct melting requires some 70 per cent of pig iron and 30 per cent of steel or malleable scrap. Duplex melting with a cupola—air furnace tandem or cupola-electric furnace installation, generally requires some 20 or 30 per cent pig, of which part should be "silvery" (high silicon) pig, and 70 to 80 per cent steel scrap. These facts, in addition to the requirement for malleable, bessemer, or high silicon pig iron, should be borne in mind when determining malleable material requirements.

We respectfully offer the following suggestions as to handling the malleable iron castings industry in connection with national mobilization:

1. Make certain that government officials responsible for procurement and manpower policies recognize the importance of malleable castings early enough to insure the placement of military orders promptly enough to prevent the foundries being forced to shut down for lack of business. Because of the high labor content in the production of castings, it is imperative not only that the foundries retain a sufficient number of workers, but it is equally important that they keep enough skilled workers. The error of assuming that the foundry could be manned with unskilled labor proved costly during World War II, and it is hoped that this error can be avoided now.

We feel that the immediate curtailment of civilian production at the outset of World War II was unnecessarily abrupt, and that had our industry been allowed to continue with a reasonable program of production of important components for civilian production, we would not have lost so high a proportion of skilled workers.

It will be no problem for the industry to convert to war production once it is known what components

(*Continued on page* 232)

SAND-MEX®

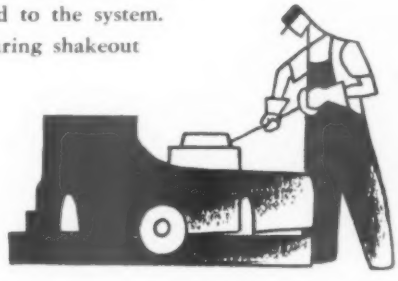
THE IDEAL FOUNDRY SAND CONDITIONER

Sand-Mex is an economical, specially prepared graphite product which, when mixed with foundry sand, increases the flowability and refractoriness of the sand. Sand-Mex is super-refractory, non-gaseous and chemically inert. By coating each grain, Sand-Mex increases stability of the sand and reduces friction between the sand grains. It insulates the sand from chemical or physical contact with the metal, and less expansion and contraction of the sand occurs when the metal is poured into the mold — this means sharper pattern impressions, resulting in castings truer to patterns.

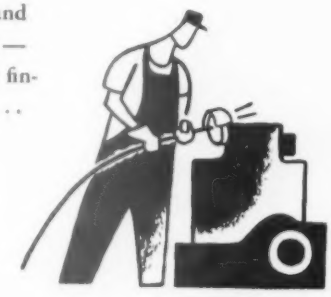
Application: Sand-Mex is easily and economically applied to molding sands at the rate of 40 pounds per ton of sand. Sand-Mex remains permanently in the sand and further additions are made only when new or untreated sand is added to the system. Sand-Mex should be thoroughly mixed, preferably mulled with the sand, in order to obtain best results.

Pouring: Sand-Mex makes molding sand easier to work, gives it greater stability by reducing expansion and contraction in pouring. It prevents chemical reaction between iron oxide and sand, thus helping to eliminate rat-tails, scabs and other defects . . . Sand treated with Sand-Mex, flows more easily and does not hang or bridge in the hoppers — permits all the system sand to be used for molding.

Shakeout: Sand-Mex increases the flowability and collapsibility of sand. This reduces shakeout time to a minimum because the sand has less retained strength, is not so strongly fused, and is more easily broken down. Also, more sand is returned to the system. Damage to casting during shakeout is minimized.



Finishing: Sand-Mex results in cleaner castings with better color and finish. Sand-Mex prevents sand from clinging to the casting — makes cleaning easier. Less finishing time, better castings . . . only two more reasons why Sand-Mex is ideal for foundry use.



THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN

(*Continued from page* 230)

are required and the orders placed. The component parts which will be made by the malleable industry will be quite similar to components needed in peacetime. It will therefore take a relatively short time to make new patterns and put them into production of defense materiel.

2. We recommend that provision be made for priority and allocation of strategic materials, including pig iron, scrap, fuel, power, fire brick, necessary grades of foundry lumber, core oils, sands and binders. Metallurgical coke is an extremely important material. It is already in short supply and the prospect is that it will continue to be scarce. An adequate supply must be made available to malleable foundries if a capacity rate of operation is to be maintained.

3. Efficient foundry operation depends heavily on specialized machinery. If the malleable industry is to operate at an optimum of efficiency, it will need priorities for necessary replacement parts and for necessary additions of efficient foundry machinery. In most cases, additional production can be achieved quicker if additional equipment is provided for established foundries which already have competent and experienced staffs.

4. The subcommittee submits the following recommendations concerning inspection and specifications:

a. That all government procurement agencies adopt the following ASTM specifications: (a) A47 for normal malleable iron; (b) A220 for pearlitic malleable iron; and (c) A197 for cupola malleable iron.

b. That there be allowed an alternate for Grade A (35018) of normal malleable iron to be used at the option of the producer. This would permit more utilization of facilities without affecting performance of the castings.

c. That government inspectors be given special training in inspection of malleable iron castings; the industry is prepared to assist in organizing and conducting such a course.

d. That government procurement regulations permit the manufacturer of end items to decide whether the malleable components should be inspected at the foundry or at the delivery point.

e. That specifications for all items indicate where malleable or pearlitic malleable iron can be used as an alternate or in place of materials now specified.

5. The committee recommends that the Munitions Board and other government agencies take full advantage of the co-operation available from the Malleable Founders' Society, the trade association for the industry. The board of directors of the society has authorized the staff to co-operate to the fullest extent needed, not only in the conduct of the industry survey and in the preparation of this report, but in furtherance of the whole mobilization program. We urge that governmental agencies utilize the assistance which can be had from the society. The committee is confident that the society can provide effective help in connection with all phases of mobilization.

Not knowing what government agency may be delegated to handle national mobilization, it is difficult to suggest the outline of an organization which might be assigned to handle malleable iron castings. We do recommend, however, that if there is an Iron and Steel Division created, either in some existing government agency or in a new one created for mobilization, that there be a Castings Division, and that one responsible and experienced man from the malleable castings industry be designated to head the Malleable

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Section of the Casting Division. The committee will be glad to suggest the names of men qualified for this position and to confer with government officials as to the qualifications of such candidates for that position.

Members of the Malleable Iron Castings subcommittee which submitted this report are:

C. L. Carter, (chairman), Albion Malleable Iron Co., Albion, Mich.; H. Nelson Albright, Columbia Malleable Castings Corp., Columbia, Pa.; G. J. Behrendt, Eastern Malleable Iron Co., Naugatuck, Conn.; C. A. Gutenkunst, Jr., Milwaukee Malleable & Grey Iron Works, Milwaukee; T. F. Hammer, Malleable Iron Fittings Co., Branford, Conn.; Anthony Haswell, Dayton Malleable Iron Co., Dayton, O.; A. F. Jackson, Lake City Malleable Co., Cleveland; W. D. McMillan, McCormick Works, International Harvester Co., Chicago; P. H. Vincent, Erie Malleable Iron Co., Erie, Pa.; L. J. Wise, Chicago Malleable Castings Co., Chicago.

Book Review

Data on Corrosion and Heat Resistant Steels and Alloys—Wrought and Cast, paper, 79 pages, 6 x 9 inches, published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $2.50.

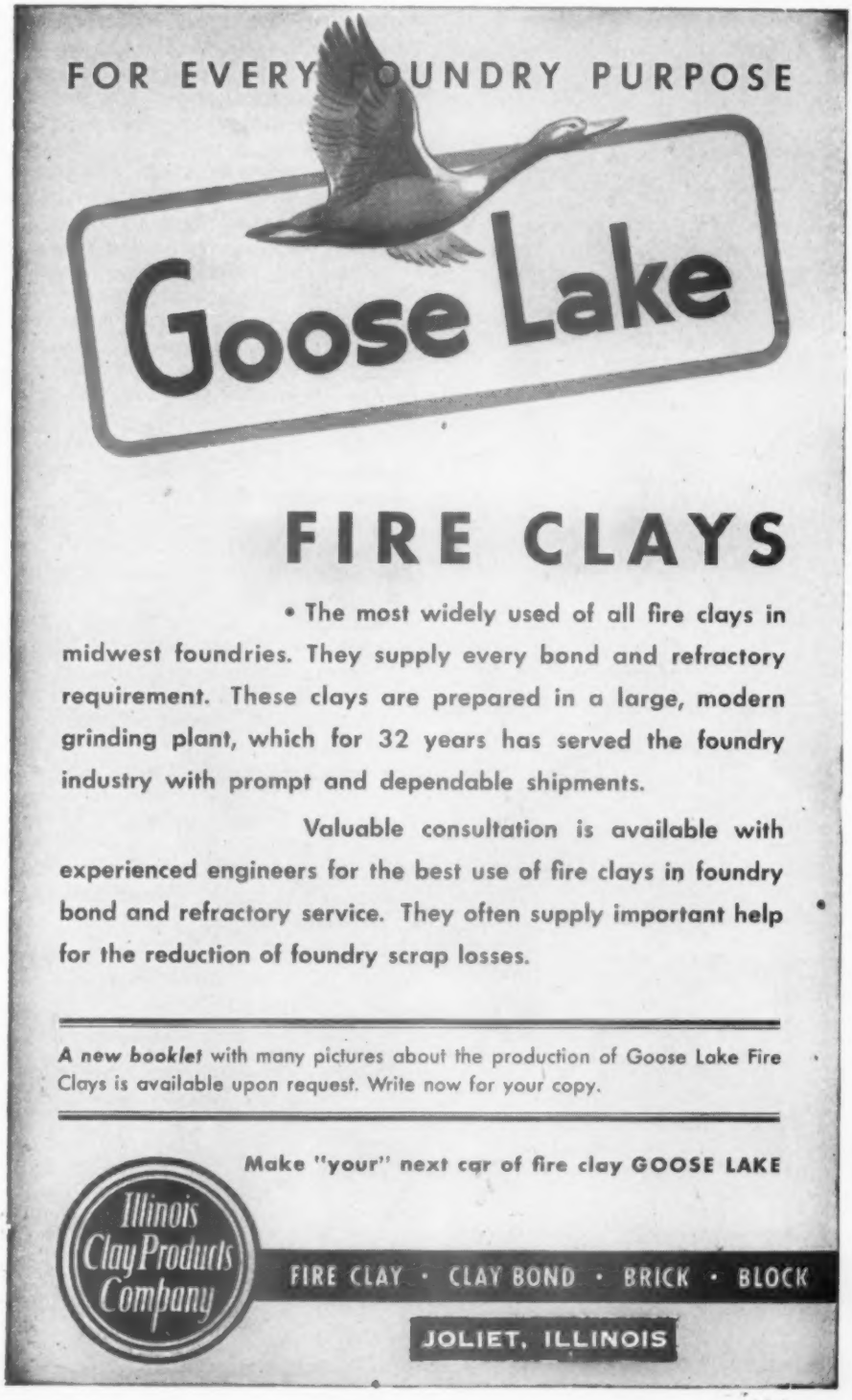
This volume comprises new tables of data on compositions and properties of wrought corrosion-resistant and heat-resistant chromium and nickel-chromium steels and alloy castings which were assembled by Committee A-10 on Iron-Chromium-Nickel and Related Alloys. Present classification provides data on those stainless steels which have received widest commercial usage, and the data have been condensed to the simplest form to provide a ready reference for both maker and user. Part I relates to wrought alloys, Part II to cast alloys.

Book Review

Symposium on Testing of Cast Iron with SR-4 Type of Gage, 92 pages, 6 x 9 in., published by the American Society for Testing Materials, Philadelphia 3. Price $1.65.

Papers and discussion in this book were presented at the 1949 annual meeting of the society and include: "Stress Analysis of Automotive Cylinder Blocks" by M. A. Erickson; "Residual Stresses in Cylinder Blocks" by R. J. King; "Analysis of Locked-in Stresses in Automotive Cylinder Blocks" by S. J. Stockett and H. W. Lownie Jr.; "Strain Testing of Crankshafts, Engine Frames and Cylinders" by H. M. Hardy and T. O. Kuivinen; "Strain Gage Tests on Diesel Cylinder Blocks, Heads and Pistons" by C. L. Newton and J. D. Swannack; "Stress-strain Tests on Rectangular Cast Iron Beams" by O. Smalley.

"Stress-strain Tests on Various Cast Iron Beam Sections" by H. M. Hardy and T. O. Kuivinen; "Stress Analysis of a 125-lb Valve Assembly" by V. T. Malcolm and S. Low; "Stress Analysis of a Cast Iron Split Tapping Sleeve" by E. C. Sears, J. W. Miner and E. D. McCauley; "Stress Analysis of Cast Iron for Valve Parts" by H. Wyatt; "Residual Stresses in Cast Iron Deaerating Trays" by J. A. Cameron; "Some Strain Gage Studies of Cast Iron Punch Press Frames" by G. A. Brewer; "Stress Determination in Cast Irons for Railroad Service" by R. A. Flinn and R. J. Ely; "Location and Measurement of Stresses in Gray Iron Tractor Castings" by H. Bornstein, and "Stress-strain Studies of Cast Iron for Textile Machinery Parts" by V. E. Hillman.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JOLIET, ILLINOIS

New EQUIPMENT and Supplies

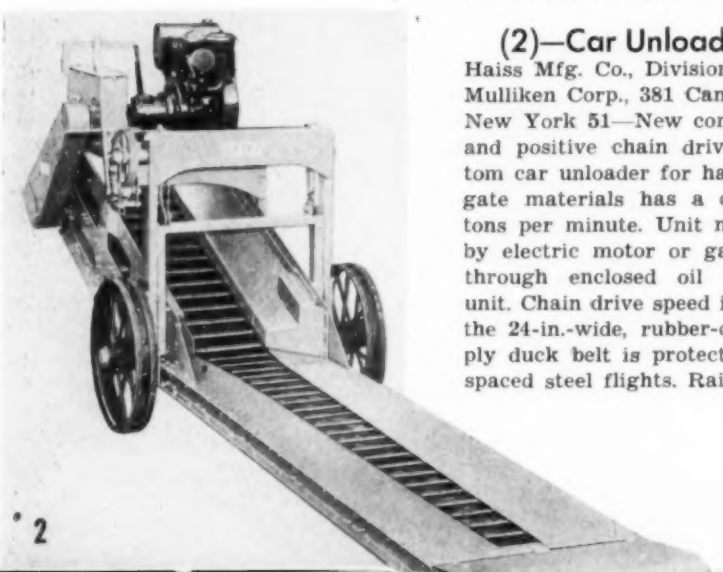
For Additional Information on these Items Use Reply Card—Page 237

1

(1)—Sand Washer:

Claud S. Gordon Co., 3000 South Wallace St., Chicago 16—Unit is used for determining clay content of foundry sands, and employs a centrifugal unit for that purpose. A single-blade impeller driven at high speed by an electric motor throws the sand grains against baffles suspended in the beaker containing sand and water. Motor is attached by a bracket to a rod which slides vertically in the column, permitting lowering of the centrifugal unit into each beaker. A syphon with inlet located 1 in. from bottom of the beaker removes wash water containing the clay from the beaker. After repeated washings, all clay is removed from the sand. The difference in weight of the sand sample before and after washing is the clay content.

For More Details Circle No. 1—Page 237



2

(2)—Car Unloader:

George Haiss Mfg. Co., Division of Pettibone Mulliken Corp., 381 Canal Pl., Bronx, New York 51—New combination belt and positive chain drive hopper-bottom car unloader for handling aggregate materials has a capacity of 5 tons per minute. Unit may be driven by electric motor or gasoline engine through enclosed oil bath reducer unit. Chain drive speed is 90 fpm, and the 24-in.-wide, rubber-covered, four-ply duck belt is protected by closely spaced steel flights. Raising and lowering is accomplished through multi-strand cables on 4-in. channel mast, operated through gear and pinion with safety pawl. For permanent installation, lifting mast is eliminated. Unit can be mounted on 4 x 30-in. steel or 6.00 x 16-in. pneumatic tired roller bearing wheels. Standard tow hitch is provided at feed end. Two tow eyes are provided on head end of horizontal channel for pulling from pit.

For More Details Circle No. 2—Page 237

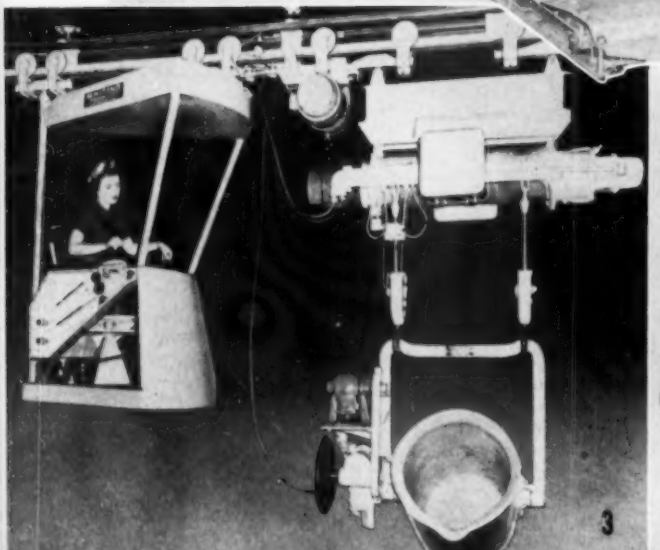
(3)—Hot Metal Carrier:

Whiting Corp., 15607 Lathrop Ave., Harvey Ill.—Electrified hot metal carrier is equipped with magnetic controls. All motions, raising or lowering and pouring angle of ladle, plus forward and backward travel of carrier, are controlled by two finger-tip levers. One lever, through cable-operated master switches, actuates starters to raise, lower and tip the ladle. Forward and backward travel of the carrier is controlled by the other lever. Power for carrier travel is supplied by a gearhead motor, through a roller chain to a synthetic-rubber-covered wheel which bears against the underside of the monorail. Hoist and carrier is available in a variety of speeds, and carrier capacity may be designed for pouring up to 3 tons of metal.

For More Details Circle No. 3—Page 237

(4)—Snagging Grinders:

Standard Electrical Tool Co., 2507 River Rd., Cincinnati 4—Twin motor, double end grinders are designed to permit independent operation of each



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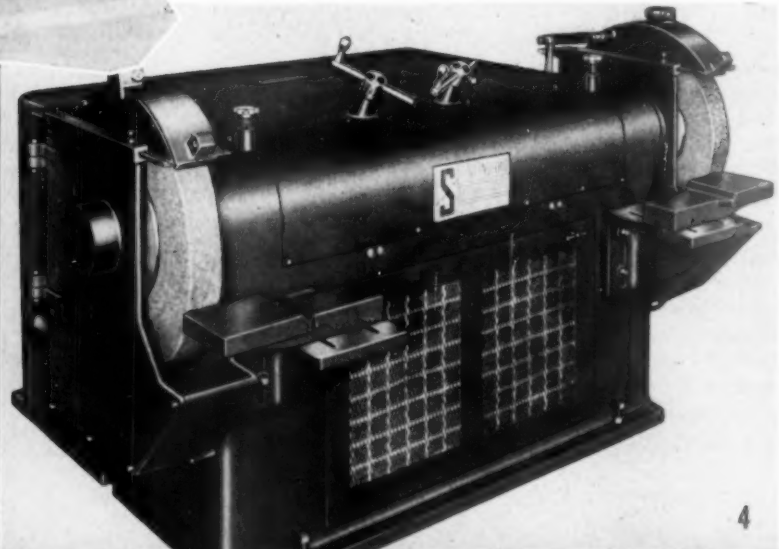


4

grinding wheel. Each wheel is powered by an individual motor having its own magnetic starter and separate start-stop pushbutton station, shaft lock for use when changing wheels, and independent infinitely variable speed drive. As the individual wheel reduces in diameter, turning of the crank handle at top front of machine simultaneously adjusts the guard for maximum protection and increases the spindle speed in direct relation to the worn wheel diameter, permitting maintenance of 9500 sfpm throughout wheel life. A safety interlock prevents over-speeding of the grinding wheels. One grinder is designed for two 7½ or 10 hp motors for 24-in. diam x 1½ to 4-in. face x 12 in. hole resinoid bond grinding wheels. Another model takes two 15, 20 or 25 hp motors for 24 or 30-in. diam x 1½ to 4-in. face x 12 in. hole resinoid bond wheels. Grinder also is furnished for vitrified bond wheels and infinitely variable spindle speed to deliver 6500 sfpm.

For More Details Circle No. 4—Page 237

Goggles: American Optical Co., Southbridge, Mass.—Company's foundry goggles, Nos. 305 and 306, now are supplied with vinyl plastic face masks which can be sterilized by spraying, wiping or dipping (not boiling), and will retain their shape and properties, it is claimed. It also is said that the plastic will not shrink or curl and that perspiration will not harden it.

For More Details Circle No. 5—Page 237

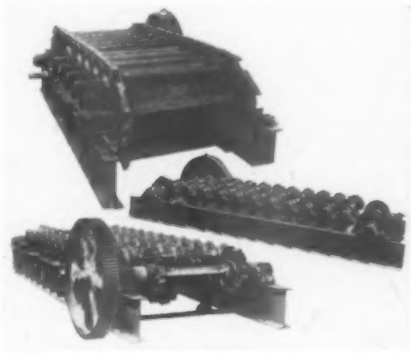
Protective Masks: General Scientific Equipment Co., 2700 West Huntingdon St., Philadelphia 32 — Masks consist of an aluminum shield, held in position by an adjustable elastic head band, and replaceable laminated filters. They are designed to protect throat, nose and bronchial tubes from larger particles of nontoxic dusts that irritate these membranes, causing discomfort and increased susceptibility to infection. Masks weigh less than ½ oz and are said to be cool and comfortable.

For More Details Circle No. 6—Page 237

Marking Stamps: Acme Marking Equipment Co., 8030 Lyndon, Detroit 21—Set of metal marking stamps contains 31 fractional figures, separated by 32nds, and the whole numbers, 1, 2, and 3, as well as a dash and an inches sign. Stamps are made of high-grade tool steel, blued for rust prevention, and with striking heads tempered by a special process said to prevent chipping or mushrooming. Sets are furnished in hardwood cases, with individual compartments for each stamp.

For More Details Circle No. 7—Page 237

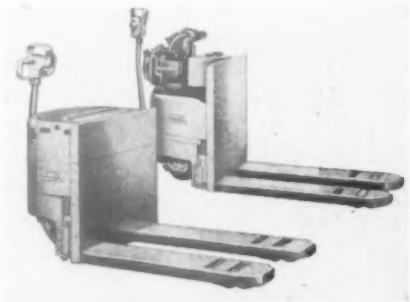
Feeder: Pioneer Engineering Works, 1515 Central Ave. NE., Minneapolis 13—Heavy duty feeder is 72-in. wide and is available in lengths up to 60 ft. Feeder pans and all other wearing parts, such as drive sprocket and supporting rollers, are cast manganese steel. Features include interlocking support points on the pans proper, and clean-out wedges in the pans links to remove dirt on the return side. Drive links are cast integrally with the pan to eliminate bolts and rivets. Pans have upturned lugs at the ends to form an interlocking continuous lip for reducing



spillage. Return idlers and a screw take-up are provided. Other feeders are offered, beginning with a 36-in. width. Feeders are designed to operate horizontally or at an incline up to 20 degrees. They are driven by gear motor or through commercial reducer. Power must be transmitted to feeder through chain drive, or through reduction gears.

For More Details Circle No. 8—Page 237

Hand Trucks: Clark Equipment Co., Industrial Truck Division, Battle Creek 16, Mich.—Hand trucks in two power types have one basic design. One truck is battery-powered with electric motor drive and hydraulic lift; the other is gasoline engine-powered with hydraulic motor drive and lift. Both trucks are said to have a short wheelbase and short turning radius, high maneuverability, and easy accessibility of parts for maintenance. The electric truck features automatic acceleration; motor mounted inside 14-in. drive wheel with entire drive unit enclosed; self-energizing brake which is applied automatically when operator takes his hand off control button, decelerating smoothly to protect the load. The engine in the gasoline powered model



is a two-cylinder opposed type, air cooled, and rated at 5.5 bhp at the governed speed of 2800 rpm. It drives an eccentric vane type hydraulic pump. The hydraulic motor is mounted in the same manner as the electric motor—in the 14-in. drive wheel—and is said to develop 90 per cent of full torque below 10 rpm. Both models are rated up to 6000-lb load capacity, and have forward and reverse speeds controllable from the handle.

For More Details Circle No. 9—Page 237

Burner: Eclipse Fuel Engineering Co., 834 South Main St., Rockford, Ill.—Sealed burner is designed for gas-burning installations requiring instantaneous flame failure protection and constant pilot. Features claimed for the burner include high input efficiency resulting from venturi design, better control of air-gas ratio, and placing of the burner shell entirely outside the furnace shell. This location is intended to provide longer life for the burner by exposing it less to furnace temperatures. The burner is recommended for use where temperatures are low or on furnaces where burners are in a difficult-to-light location.

For More Details Circle No. 10—Page 237

Core Baking Tunnel: Induction Heating Corp., 181 Wythe Ave., Brooklyn 11, N. Y.—New model electronic core baking tunnel is designed to bake cores evenly throughout, with an average baking cycle of a few minutes. It has a capacity of 4 tons of cores per hour and is capable of taking cores up to 60 in. wide with a maximum combined height of core and core plate of 20 in. The approximate overall dimensions of the tunnel are 8 ft wide, 8 ft high and 25 ft long. Conveyor speed is adjustable from 0 to approximately 6 fpm. Pow-

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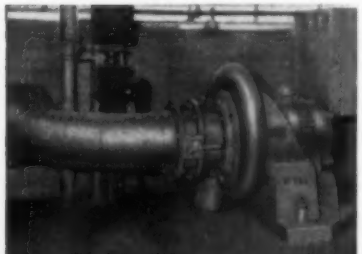
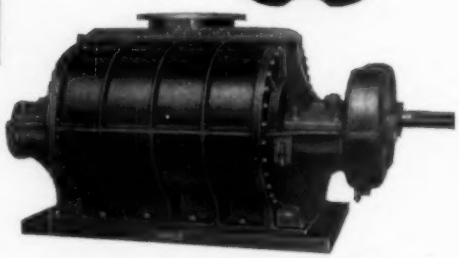


Type OI Centrifugal Blower, driven by 40 hp motor. Capacity 4,400 cfm.

Type RCS Blower, typical of the 14 standard R-C Rotary Positive designs of cupola blowers.

ROTARY



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er requirements are 200 kva, input 500 v, 3 phase, 60 cycle current. Tunnel automatically adjusts its power consumption in proportion to the amount of cores being baked. Green strength, hot strength, hardness, collapsibility, and other characteristics of the cores may be adjusted and controlled. All heat is generated within the cores; no heat is given off to the surrounding atmosphere, resulting in comfortable working conditions in all sections of the coremaking department in the foundry.

For More Details Circle No. 11—Page 237

Lifting Magnet: Dings Magnetic Separator Co., 4708 West Electric Ave., Milwaukee 14—Lifting magnet has been improved over earlier models and has the following features: lighter weight, welded construction replaces

bolted construction, an insulating compound that dissipates heat more rapidly and provides more protection against short circuits between individual coil wires, four-point chain suspension instead of three, protector guards for the cable, a balanced magnetic circuit that eliminates flux "bottle-necks" and thereby gives the magnet greater lifting ability. It is available in diameters of 29, 39, 45, 55, and 65 in.

For More Details Circle No. 12—Page 237

Thermocouples: Brown Instruments Division, Minneapolis-Honeywell Regulator Co., Wayne & Roberts Ave., Philadelphia 44—Improved thermocouples have speed responses up to nine times that of previous models. Increased speed of response has been made possible by three changes: 1. Mass of the hot junction is reduced considerably in the 8, 14, and 20 gage types. 2. The thermocouple wire is shaped to form a loop close to the hot junction. The insulator is faced about 1 in. from

(*Continued on page* 239)

HELPFUL LITERATURE

50. Dew Point Meter

Illinois Testing Laboratories, Inc. —6-page illustrated bulletin No. 2051 presents Alnor Dewpointer for fast accurate determination of dew points, water vapor density and pressure and percentage of water vapor by volume.

51. Foundry Mullor

Pettibone Mulliken Corp., Beardsley & Piper Div.—36-page illustrated bulletin No. 1220 is descriptive of Speedmullor line of foundry mulling machines. Presented are comparative performance characteristics, power and maintenance requirements, auxiliary equipment and combination sand conditioning and mulling units.

52. Heat Treating Ovens

Young Brothers Co.—12-page illustrated bulletin 4T describes line of batch, pit and continuous conveyor types of heat treating ovens. Standard and special constructions for low temperature heat treating of steel, cast iron, brass, aluminum, magnesium, bronze, glass and plastics are covered.

53. Conveyors

Pioneer Engineering Works—52-page illustrated handbok form No. 612 covers Continuflo pre-engineered and job-engineered aggregate or bulk-materials conveyors. Methods of determining correct type from such factors as angle of incline, spacing of idlers, motor horsepower, width and length required and specific application are included.

54. Special Shape Refractories

Ironton Fire Brick Co.—2-page illustrated leaflet "Special Shapes" depicts production operations and some of the special shapes made of Kentucky flint and semi-flint clays, engineered to individual furnace conditions and dried by special method.

55. Nonmetallic Blast Grit

American Wheelabrator & Equipment Corp.—4-page illustrated bulletin No. 79 on Black Beauty nonmetallic silicafree blast grit tells how this fast-cutting abrasive retains its abrading properties even when reduced to fine material. It is noncorrosive and rustless, flows freely, will not attract moisture and does not pack or harden.

56. Castable Refractory

Charles Taylor Sons Co.—4-page illustrated bulletin No. 313 discusses properties and applications of sillimanite Hydrocast mullite-base castable refractory for use at temperatures up to 3000° F. It is recommended for making small special shapes, burner blocks, car decks, varnish fire domes and door linings.

57. Batch Type Furnace

Holcroft & Co.—4-page illustrated bulletin discusses completely automatic cycle of batch-type furnace for controlled atmosphere heat treating and presents suggestions on how furnace can fit into production lines.

58. Electric Hoists

American Engineering Co. — 36-page illustrated catalog H-46 lists five classes of monorail Lo-Hed electric hoists with capacities ranging from ¼ to 12 tons. Information is given also on Lo-Hed stationary hoists and electric car pullers.

59. Shovels & Cranes

Thew Shovel Co.—Two illustrated catalogs, "Lorain-50 Series" and "Lorain-TL Series," describe 1-yd capacity power shovel and ½ and ¾-yd machines, respectively. Former is available with four different size crawlers while latter type can be obtained as Self-Propelled and Moto-Crane models.

60. Adhesives

B. F. Goodrich Co.—8-page illustrated catalog section No. 9160 lists each type adhesive manufactured, materials for which they are specifically recommended and method by which most effective bond is created. Materials covered include Buna N compounds and coated fabrics; Neoprene, natural and GRS rubber; and various laminating compounds.

ADDITIONAL INFORMATION?

For additional information on any of the items described under "New Equipment and Supplies", "Trade Publications" or "Helpful Literature" in this issue — simply circle their corresponding item numbers on one of these cards.

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61. Radiography

Eldorado Mining & Refining (1944) Ltd.—72-page illustrated "Handbook on Radiography" is manual on use of radium and cobalt 60 in industrial radiography. Sections are devoted to source of radiation, fundamentals of radiography, necessary equipment, determination of exposure time, applications, interpretations, and radioactive isotopes.

62. Circular Bin Discharger

Stephens-Adamson Mfg. Co.—4-page illustrated bulletin No. 250 describes circular bin discharger designed for handling pulverized, granular, glutinous and soft lump materials that may puck or arch and refuse to discharge by gravity. Two types are available: one with flight fingers above bin bottom and other with flights above and below bin bottom.

63. Beryllium Copper

Beryllium Corp.—2-page illustrated technical bulletin No. 2 relates application of Berylco 25 as cage for roller bearings. Properties of this wrought material containing 2 per cent normal beryllium which has good electrical conductivity and high strength and hardness when heat treated are discussed. Cast Berylco 20C for sand, investment and plaster-mold casting is covered also.

64. Industrial Fans

Clarage Fan Co.—4-page illustrated bulletin No. 113 is descriptive of type W class three and class four industrial fans for forced draft and heavy-duty service. Data includes information on both single and double width fans for various types of applications.

65. Electric Arc Furnaces

Whiting Corp.—40-page illustrated bulletin FY-168 discusses advantages and costs of electric melting and describes features of Hydro-Arc furnaces. Design of electrode arms and clamps and method of electrode positioning are explained.

66. Molds & Cores

Monsanto Chemical Co. — 16-page illustrated bulletin No. 61 explains 'C' process for making molds and cores for foundry use that are composed of shells of sand bonded together by thermosetting resin. Molds made by this technique weigh but small fraction of those made in green sand.

67. Mechanized Metal Pouring

Modern Equipment Co.—4-page illustrated form No. 6500 is case study report on nonferrous and ferrous metal pouring. Use of pouring machines to convey molten metal over monorail to pouring floor is shown.

68. Fork Lift Trucks

Mobilift Corp.—6-page illustrated bulletin M-410 is descriptive of model E 'Stand-Up' and model ER 'Sit-Down' 2000-lb capacity Lev-R-Matic drive fork lift trucks.

69. Wire Rope

Macwhyte Co.—4-page illustrated bulletin No. 50-25 contains information on Monarch Whyte Strand improved plow steel wire rope and lists all sizes and construction classifications in one large table.

70. Overhead Electric Cranes

Northern Engineering Works—8-page illustrated bulletin HL-115 describes design and construction of auxiliary overhead electric traveling cranes, lists specifications and shows installations in various types of industrial service.

71. Materials Handling

Union Metal Mfg. Co.—24-page illustrated catalog 77 features line of corrugated steel boxes, skids, pallets and combination units. Intended applications in handling, production flow and storage situations are depicted.

72. Refractories

A. P. Green Fire Brick Co.—12-page illustrated bulletin "KX-99" describes line of refractories developed expressly to meet requirements of the steel industry. Blast furnace brick in complete range of sizes and shapes can be used in blast furnaces, hot metal mixers and hot metal cars. Also covered briefly are several other refractory products for steel industry service.

73. Molten Metal Purifiers

Eastern Foundry Supplies, Inc. — 4-page circular D describes how Foundrates are used for purifying and protecting molten metal to assure dependable and economical composition under laboratory control. Listed are various ferrous and nonferrous metals with which this chemical preparation can be used.

74. Electric Industrial Truck

Automatic Transportation Co. — 6-page illustrated bulletin No. 1014 depicts and describes Transporter '101' driver-led power pallet and platform trucks with electric or foot lifts and having either 4000 or 6000-lb capacities.

75. Boosters & Accumulators

Miller Motor Co.—12-page illustrated bulletin B-200 tells how boosters and accumulators are used in place of air cylinders and hydraulic pumps to improve clamping, punching, shearing, stamping, crimping and pressing operations. Selector chart provides circuit diagrams, simplified formulas and dimensional data.

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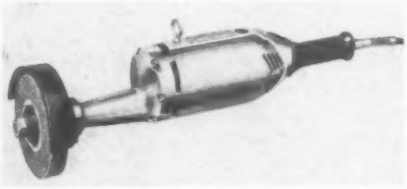
(*Continued from Page* 236)

the welded tip, reducing conduction from the cold end. Dimensions of the loop permit it to fit tightly inside a well, furnishing metal-to-metal contact, eliminating dead air space.

For More Details Circle No. 13—Page 237

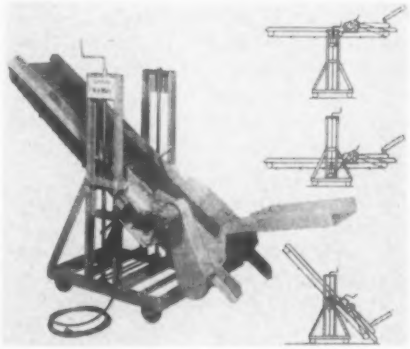
Grinder: Skilsaw Inc., 5033 Elston Ave., Chicago 30—Newly designed 6-in. portable grinder is engineered for continuous operation in



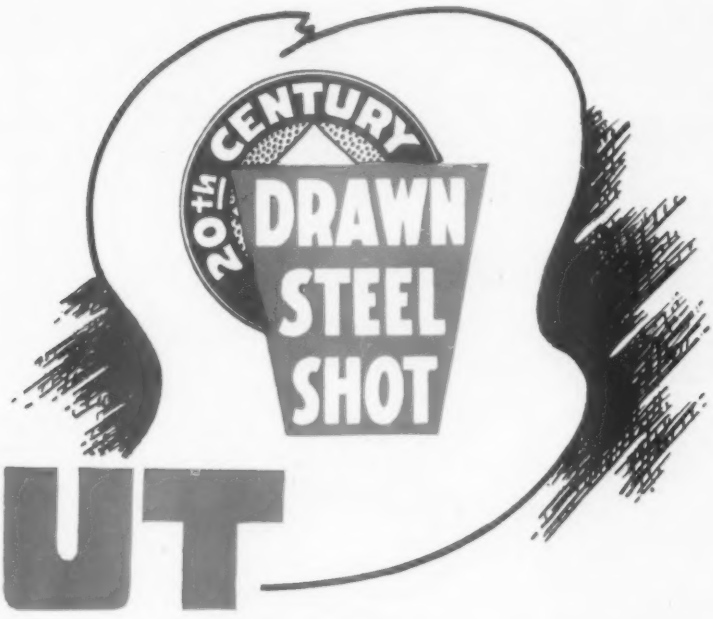
grinding heavy castings, wire brushing or buffing and polishing any metal surface. Tool has molded, covered rear handle for comfort and positive control, and a suspension eye bolt to permit convenient overhead suspension. Grinder weighs 19½ lb and is said to have good balance. It is equipped with an alternating-direct current motor and is 23½ in. long.

For More Details Circle No. 14—Page 237

Conveyor: May - Fran Engineering Inc., 1692 Clarkstone Rd., Cleveland 12—Adjustable and portable conveyor is designed for materials handling applications in which working heights and areas change frequently. It is suitable for use with permanent conveyor systems as an auxiliary unit to feed or discharge high production items. Working height of the conveyor is regulated through a 30-in. range by a double screw center lift. Crank handle on conveyor facilitates pitch adjustment from horizontal to a maximum of 45 degrees. Portability is provided by



two swivel and two stationary casters. Conveyor is available in 4, 6, 8, 10 and 12-ft lengths with belts 12, 18, or 24 in. wide. Standard belting is either cleated white cotton or neoprene impregnated. Hinged steel conveyor belting also can be furnished. A charging chute with positive trap



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is standard equipment on each unit. For operation in congested areas, a special swivel charging chute which permits feeding at any point within a 180-degree radius can be furnished. Conveyor is powered with a single or 3-phase, 110 or 220 v, 60 cycle, geared-head fractional horsepower motor. Other motors can be supplied on order.

For More Details Circle No. 15—Page 237

Metal Spray Gun: Cooper Alloy Foundry Co., Foundry Accessories Division, Bloy & Ramsey Ave., Hillside 5, N. J.—Spray gun for spraying low melting alloys and metals was designed for use with a new method for making aluminum core boxes but has found application for other industrial uses such as pattern-making, precision casting, and maintenance and repair work. Features of the gun include adjustable spray; nonclog, nondrip nozzle; thermostatic

control; light weight, under 5 lb; capacity of 7 lb of low melting alloy, and simplicity of operation.

For More Details Circle No. 16—Page 237

Air Heater: W. S. Rockwell Co., 200 Eliot St., Fairfield, Conn.—Gas-fired air heater provides uniform forced circulation of heated air to 600°F for industrial ovens and driers. Recirculation of heated air in the manner provided by the heater is said to allow rapid and uniform convection heating, accurate control of oven ventilation and complete safety of operation. Heater is applicable where there is no objection to contact of material with diluted products of gas combustion, such as in drying cores and molds. The cylindrically shaped heater is constructed of corrosion resistant aluminized sheet steel with 2 in. of mineral wool. Unit is designed for pull-through operation, the recirculating fan being located beyond the heater outlet, thereby maintaining a negative pressure in the heater. It is available in six capaci-

ties from 250,000 to 2 million Btu per hour. Equipment includes a solenoid control valve, Factory Mutual approved safety shut-off valve, and a constant burning gas pilot with a spark plug for ignition.

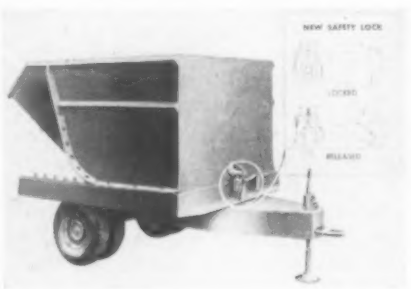
For More Details Circle No. 17—Page 237

Plate Magnets: Eriez Mfg. Co., 906 East Twelfth St., Erie, Pa.—Nonelectric plate magnets for sep-

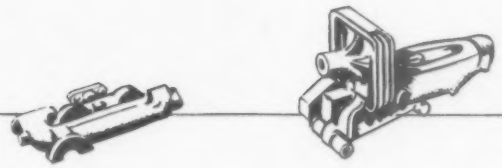
aration of tramp iron from materials in process incorporate a number of new features. Magnet castings are fully encased with a formed cover, increasing longitudinal stiffness and preventing tampering and accumulation of iron on the backs of castings with consequent formation of auxiliary magnetic poles that detract from the efficiency of the normal magnetic field. Parts are riveted rather than bolted together for added structural strength. Continuous, offset aluminum hinges are designed to fit in many positions without the use of spacers, and, of course, are nonmagnetic. They have no effect on efficiency of the magnet. Insulation of the plate's working surface confines magnetic strength where it is desired.

For More Details Circle No. 18—Page 237

Dump Trailer: Phillips Mine & Mill Supply Co., 2306 Jane St., Pittsburgh 3—New dump trailer has a 3-cu-yard self-dumping hopper with a safety lock providing positive locking and preventing accidental dumping of load. Balanced hopper automatically dumps when the safety lock



is released. Lock is designed to hold the hopper in place automatically when it returns to loading position after load has been dumped. Other features include jack stand for leveling; structural reinforcements with rolled edges to prevent injury to per-



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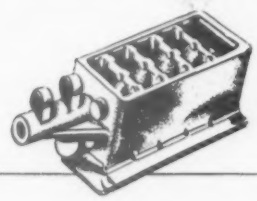

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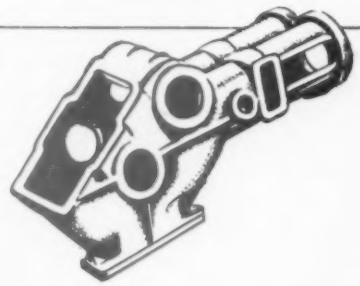

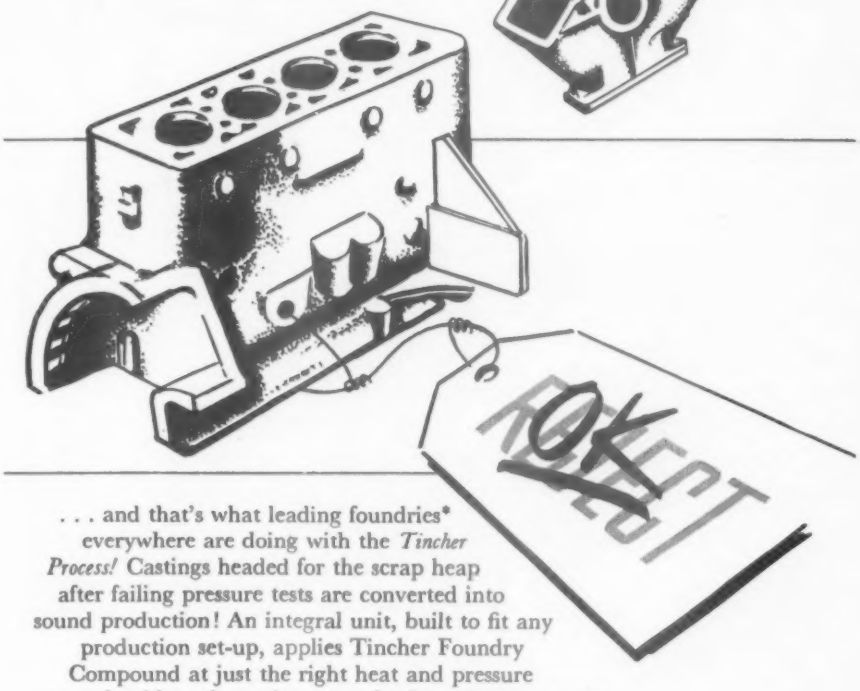

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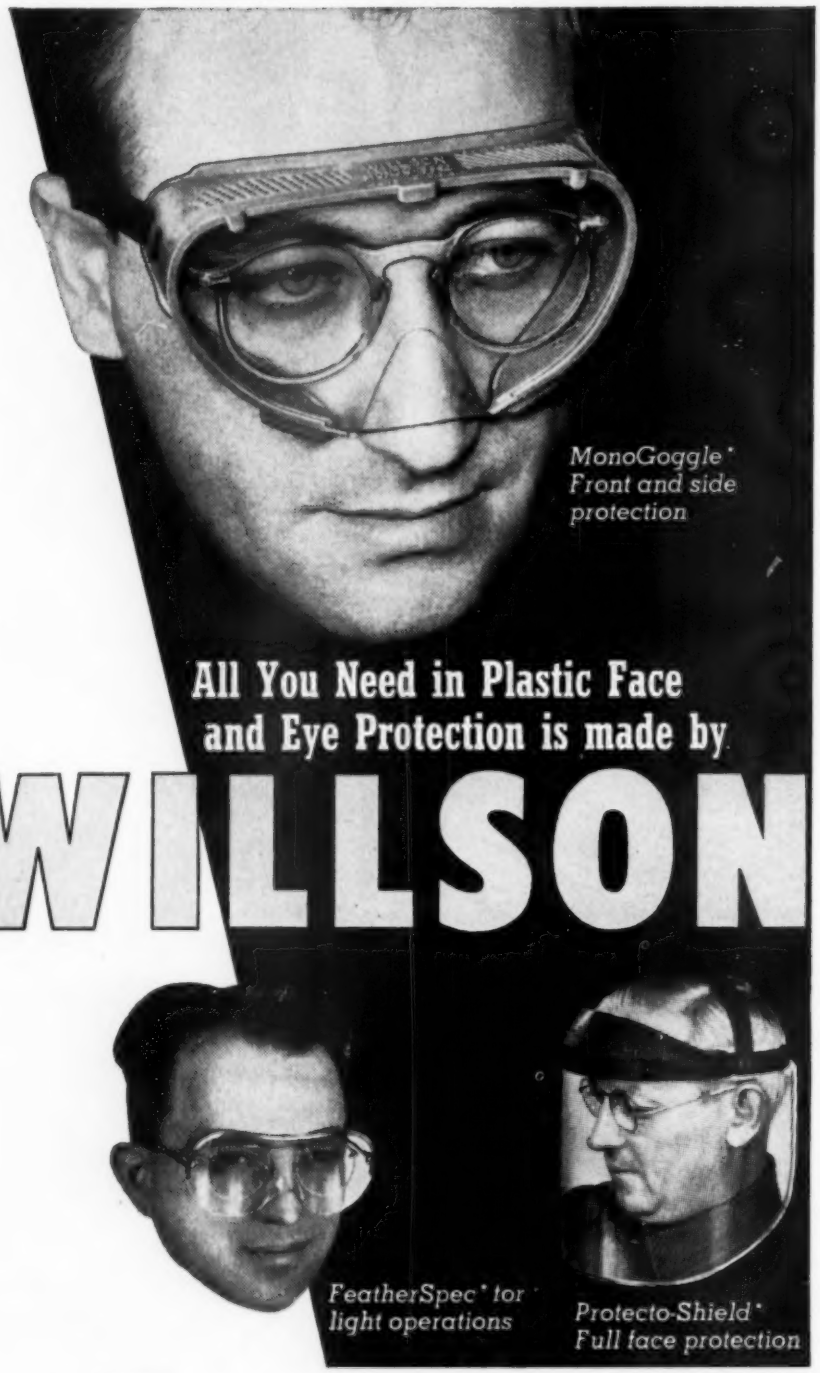

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sonnel and possible tearing of load; sturdy steel hopper and frame which ride on dual pneumatic tires, mounted underneath the frame to provide minimum overall width. Trailer is designed to be pulled and maneuvered by an industrial tractor.

For More Details Circle No. 19—Page 237

Annealing Pot Dumper: Towmotor Corp., 1226 East 152nd St., Cleveland 10—Annealing pot dumper is a modification of the company's revolving barrel grab, with special gripping shoes pivoted on the grab arms for self-positioning around

heavy, irregularly-shaped annealing pots. Machine picks up a pot of castings after it has been removed from the annealing oven and cooled, carries the load to a shake-out table, inverts the pot and places it on the table. When the pot is empty the machine picks it up, rotates it to an upright position, and returns it to annealing department for further use. Shown mounted on a model LT-48 truck, the dumper has a capacity of 2100 lb at 30-in. load center. Height of lift is 108 in. and overall lowered height is 83½ in.

For More Details Circle No. 20—Page 237

Portable Tester: Menlo Research Laboratory, P.O. Box 522 DB, Menlo Park, Calif.—Portable ultraviolet light source has been developed for nondestructive testing of objects too large for transport to a permanently installed black light booth. The instrument features self-powered operation through use of standard size D flashlight batteries. It is claimed that observation may be made under the most intense ambient light. A focussing eyepiece provides three times magnification for the observer. Total weight of the unit is less than 2 lb.

For More Details Circle No. 21—Page 237

Sling Chains: Cleveland Chain & Mfg. Co., Broadway Ave. & Henry St., Cleveland—Line of wrought iron sling chains consists of single, double, three-way and four-way slings of vir-

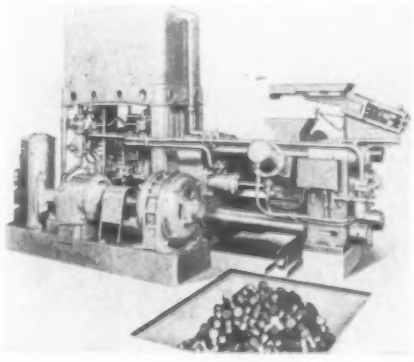
tually any desired length. Standard slings are made up of $\frac{3}{8}$-in. to $1\frac{1}{2}$-in. chain. Larger chain is available on special order. Chains are reputed to stretch up to 30 per cent before breaking when overloaded. This elongation can be seen and provides a visual safeguard against sudden, unexpected breaks. Sling chains are furnished with rings and slip hooks unless otherwise specified. Pear-shaped links may be used instead of rings and grab hooks substituted for sling hooks when desired. Fittings are designed with greater strength than the chain on which they are used.

For More Details Circle No. 22—Page 237

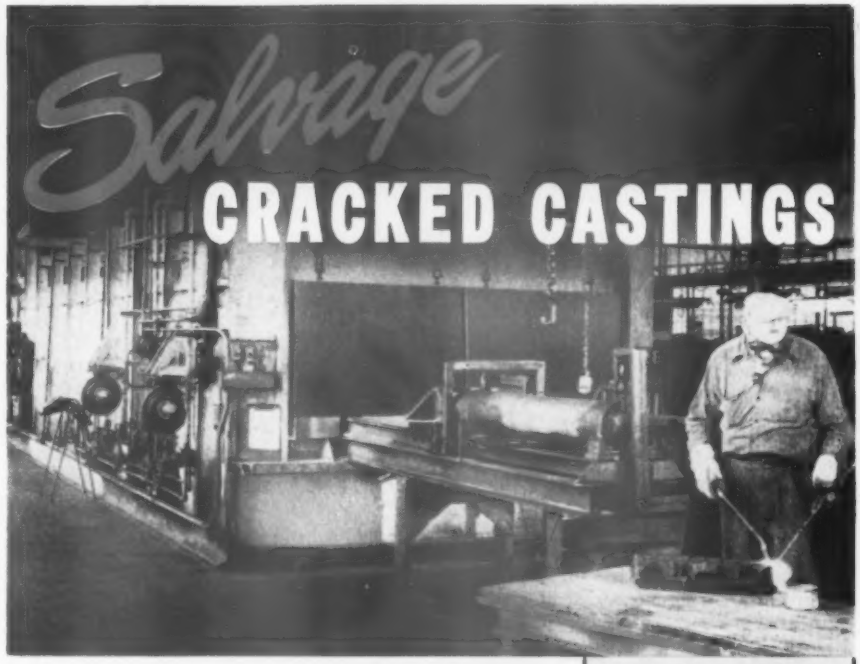
Coreboxes: Industrial Pattern Works, 2625 West Belmont Ave., Chicago 18—Newly developed blower coreboxes are made of an aluminum alloy of good wear resistance and are said to be replaced more cheaply than repaired. The coreboxes, and "place-on" or "blow-in" driers, are produced by using a permanent hob or mandrel, similar to that used in die sinking. The method is said to make possible production of any number of coreboxes with a fine finish without hand finishing or tooling of any kind. Exact duplication of dimensions in the corebox cavity to within plus or minus 0.003 in. in 12 in. is obtainable, it is claimed.

For More Details Circle No. 23—Page 237

Briquetting Presses: Milwaukee Foundry Equipment Division, SPO Inc., 6449 Grand Division Ave., Cleveland 5 — Briquetting presses, now available in five sizes, are designed to convert low grade bulk metal turnings, borings, chips, and shavings into dense cylindrical metal blocks suitable for charging directly



into a foundry cupola as high grade scrap. Machines are designed to accommodate steel, iron, brass, magnesium, bronze, and aluminum chips, shavings, or turnings. All operations are controlled automatically either hydraulically or electrically. Briquets formed have a density of 70 to 80 per cent and range in weight



THE heat treatment for welding of large cracked castings such as cylinder heads and blocks has been simplified by the Holcroft "salvage" annealing furnace.

To insure a sound serviceable weld, the cracked castings must be heated gradually to 1100° F, welded at about 1000° F, and then annealed to remove any of the residual stresses resulting from the welding. Extreme efficiency is required, not only to keep salvage costs at a minimum, but also because of the indeterminate number of castings processed daily.

Two rows of castings—propelled by a hydraulic pusher—move in opposite directions. The welded castings to be annealed are charged at the heating end of the furnace. After quickly reheating to 1100° F, they advance through the furnace, passing the cold castings moving toward the heating chamber. Thus, the annealed castings are slowly cooled and the cold castings slowly preheated. The heat transferred in this manner represents a substantial fuel saving.

This is only one of the many kinds of furnaces Holcroft builds for the foundry industry. Write today for complete information.

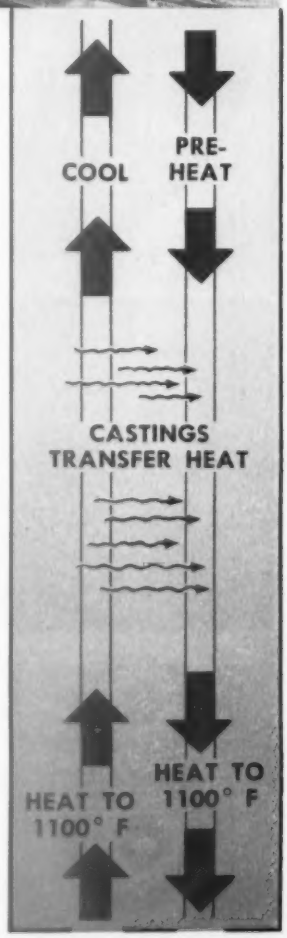


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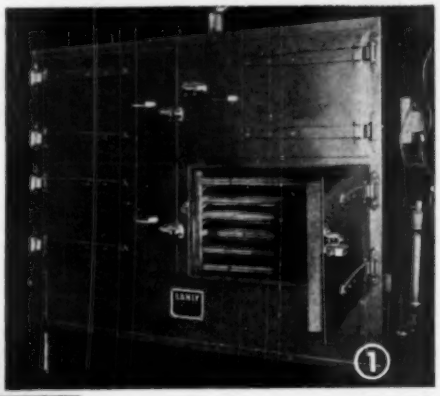
Fig. 1—A Lanly Shelf Type Core Oven is heated by burners directly under the work chamber. Available in several standard sizes.

Fig. 2—A Two Compartment Car Type Mold Drying Oven. Each Compartment individually heated and controlled.



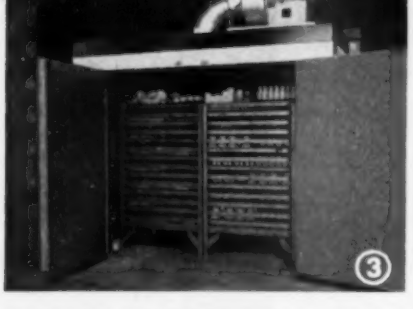
LANLY
CORE AND MOLD OVENS
meet drying needs of all foundries
LARGE OR SMALL

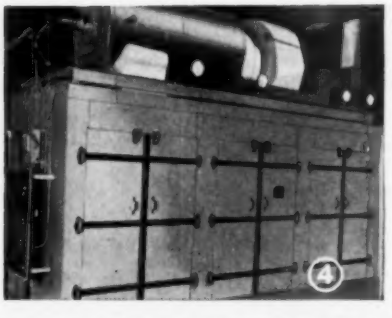
Fig. 3 — A Rack Type Oven which accommodates two racks side by side with a single set of doors.

Fig. 4 — Three Compartment Rack Type Oven with quick change-over combination gas burner equipment.

WHETHER your particular requirements concern core baking, pasting and mold drying, or ovens and air draw furnaces for casting conditioning and heat treating, the Lanly organization of experts is well qualified to serve you.

If a Lanly standard unit does not fit into your picture, we'll design and build one that will. Write for the Catalog.





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from 3 to 11 lb, depending upon size desired and type of scrap being converted. Finished briquets are said to be clean, free of oil and other cutting lubricants. Machines have gray iron briquet capacities of 3½, 2½, 2, 1¼, and ¾ tons per hour.

For More Details Circle No. 24—Page 237

Beam Clamp: Thompson Electric Co., 1101 Power Ave., Cleveland 14—Beam clamp is designed to suspend heaters, motor platforms, lighting fixtures, fans or blowers, conveyors, exhaust ducts, loud speakers, and many other types of overhead-mounted equipment from structural members of buildings. The cadmium plated cast malleable iron clamp is said to support loads up to 1500 lb. Clamp can be attached to standard "I," inverted "T," or "H," beams as well as trusses and girders consisting of angles or channels back-to-back. Clamp will fit structural members ranging from 4 to 8½-in. wide. Beam clamps can be equipped with a new adjustable angle fitting (shown in illustration) which provides for vertical suspension from sloping or arched roof members. The adjustable aluminum alloy fitting also permits angle mountings from wall posts or columns.

For More Details Circle No. 25—Page 237

Hoist: Lift-All Equipment Co., 400 NE. 97th Ave., Portland, Oreg.—New electric hoist, designed for one-man operation, will hoist, lower, stop and hold weights up to 2000 lb. Hoist operates on its own shop dolly, or from any position on a truck bed; it can be shifted from one mount to another by one person, it is claimed.Using push-button control at the end of a control wire, the operator is free to move about for load guidance. The boom, easily adjustable for height, swings completely around with its load. Hoist is powered by a specially designed 6-v reversible motor for positive control of the load, power up and power down. An ordinary 6-v car battery is used on the dolly, and the truck battery supplies power when hoist is truck mounted. The mechanical hoisting unit is housed in a metal

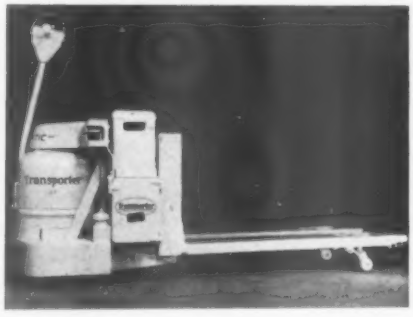
cover at the base of the mast. Drum is equipped with a 40-ft length of ¼-in., 6-strand steel cable for long lifts and to make the hoist adaptable to use as a winch.

For More Details Circle No. 26—Page 237

Thermometers: Tagliabue Instruments Division, Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark, N. J.—Set of nine matched, precision thermometers with overlapping ranges, is available in centigrade or fahrenheit scales. They were developed to provide relatively inexpensive but extremely accurate temperature measuring instruments for engineers, scientists and technicians in all research and standardizing laboratories. Instruments meet specifications of the American Society for Testing Materials and other official testing agencies covering accuracy, dimensions and performance for thermometers of this type. Inclusive ranges of each set are: Fahrenheit, minus 36 degrees to plus 760 degrees; centigrade, minus 38 to plus 405 degrees. Calibrations are in 1/10, 1/5, and 1/2 a degree centigrade; 1/5, 1/2, and 1 degree fahrenheit, with each thermometer accurate to within one scale division.

For More Details Circle No. 27—Page 237

Truck: Automatic Transportation Co., 149 West 87th St., Chicago—Driver-led electric truck is offered in platform or pallet models, each in 4000 or 6000-lb capacity. These are redesigned models and incorporate a number of improvements over previous models. Pallet truck has been shortened to 30⅞-in. plus length of forks; the platform model now is 27⅝-in. long plus platform length. Height of the new power unit is 29½-



in. Gear drive system and battery are enclosed for protection against dirt and damage. The brake is mounted on the motor shaft, and braking is through the entire gear reduction. All operations except lowering are controlled from the handle regardless of its position. On the electric lift model, lowering is accomplished by a finger-touch lever. Foot lift models also are available.

For More Details Circle No. 28—Page 237

This installation required built-up plate, welded box construction . . . fish-belly design . . . enclosed cab . . . complete weatherproofing . . . main and auxiliary hoist units (see illustration below).

How to get the most CRANE for your money

When you buy a crane, make sure you select the machine best qualified to do *your* job! The work for a crane in your plant probably differs from that in your neighbor's plant. The general crane rating and other details which are perfect for his handling problems may not be at all suitable for yours. To get the most crane for your money, let *crane duty* determine *your* choice.

It isn't entirely a matter of capacity. Travel speeds, hoisting speeds, frequency of use—all call for special consideration in the choice of a crane. That's why it's wise to discuss your problem with a Shepard Niles specialist. It's much less costly to install the *right* equipment in the beginning—than to make important changes later.

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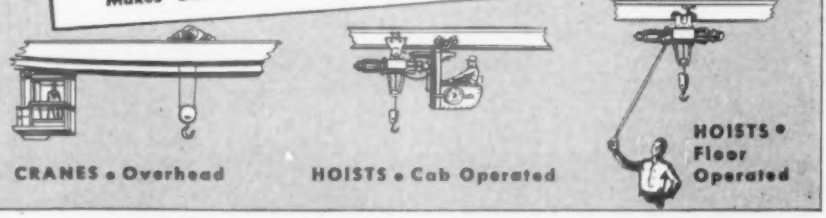

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Production Line Method Used on Labor Accounting

(*Continued from page* 107)

been pre-addressographed and pre-punched for part number and department. They are pre-printed also as to operation and the clerk merely circles the one to be recorded. The right card is easy to find, for they are written up in clock number sequence. It might seem obvious that this operation could be eliminated by having workers use the original card. However, cards prepared in the shop arrive at the payroll department soiled and frequently illegible. Having the timekeepers prepare the cards saves many hours and errors.

After extensions are made on the job cards, one of several controls is created which should be given credit for the efficiency of the operation. The cards are sorted by clock number to block number group controls. There are approximately 100 workers to each control group, showing hours and pay for each man and totals for each group control. Since all basic information for summaries and reports comes from the card, the group plan isolates errors and makes them easy to find. Timekeeper's and checker's activities require 720 man-hours.

This system provides management essentially with daily summaries, early in the afternoon, of the previous day's operation and controls which signal errors and breakdowns. Best evidence of efficiency is that the company has had practically no payroll adjustments in several years, because controls signal an error before the payroll is completed.

The job cards are then sent to the payroll department and machine posted to the employee's weekly payroll summary card. The summary cards have been addressographed with the employee's name and clock number. The group controls, previously reported, are balanced back to the timekeeping control sheet. Weekly summary cards are balanced at the end of each week to the daily posting control sheet. Hours are verified by checking clock cards at end of week. It is, of course, from the weekly payroll summary cards that the payroll is written.

Controls have been found adequate but not burdensome. Flexibility permits adjustment to problems and personnel. Ordinary office help can operate under this method.

The company operates a job operations cost system to give complete information on every element of

manufacturing expense. The more than 4000 active job-operation accounts must be summarized weekly for up-to-date cost figures. In addition, a daily report of labor costs, in hours and dollars by the control accounts within each department, must be prepared and balanced with the payroll for that day.

The payroll department carries the procedure through posting of the labor distribution summary cards which are turned over to the accounting department for compilation of final reports. The job cards are sorted to department control number and miscellaneous key punching is done at this time. Hours and dollars are added and the totals recorded on a department control sheet, which, in turn, must balance with the payroll control sheet. The job cards for each day's time are filed away until the end of the week when they are sorted to part number, account number and operation number within each department. Pre-printed labor distribution summary cards are then intersorted and listed. The resulting labor distribution totals are posted to their summary cards on a two-register posting machine. Total volume of labor transactions is well in excess of 100,000 per month. These are distributed to over 4000 labor classifications each month and give the management labor cost control over each operation on each pattern number processed through the plant during the month.

Makes Special Reports Possible

Out of all this comes final labor cost reports to accounting, usually by the second working day of the following month. What Ernest M. Knapp, president, particularly likes about the system is the special reports it makes possible. When next year's automobiles are off the drawing boards and in experimental stages, Ferro is asked: Can you make a certain part of established quality and specifications at a given price? To meet the specifications isn't too difficult, but to meet the price may be something else again. And this is the most important factor since the car manufacturer already has established the selling bracket in which he hopes to market.

Ferro management frequently makes requests for such special reports and gets them quickly and in comprehensive and accurate form. The report may indicate that changes in production schedules, addition or deletion of personnel will make the customer's demands possible.

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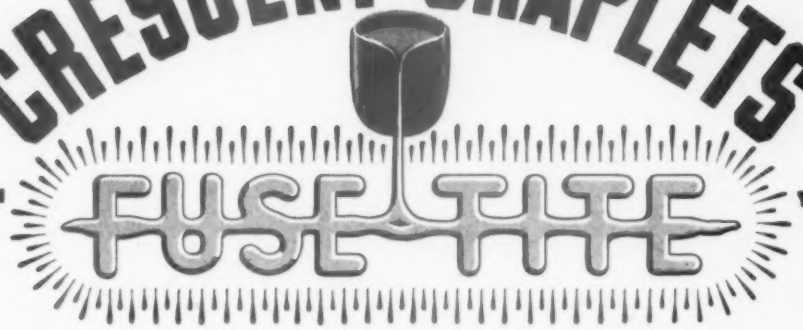

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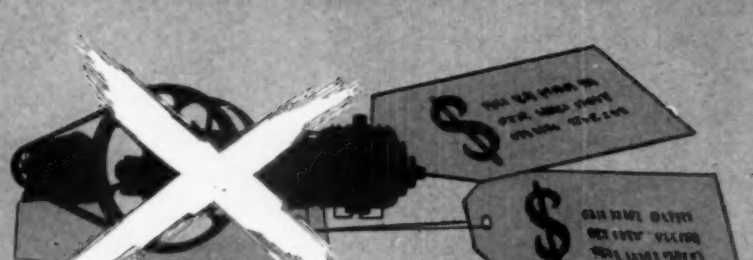

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Casting Design for Economical Molding

(*Continued from page* 93)

is also important to arrange the casting in the position most desirable for pouring to avoid mold erosion and turbulence. For example, if a stream of metal strikes a given sand core or if it strikes a ledge of a mold cavity, erosion is likely to ruin the casting. Metal should not be allowed to drop through too great a height when entering the mold cavity.

In pattern design, the least number of cores and the simplest cores usually result in more economical production. Chaplets should be avoided whenever possible because of the time lost in setting them and the possibility of defects due to the lack of fusion.

Because of the flanges on the casting in Fig. 14*A*, it is apparent that some type of core is necessary to form part of the external shape. If the parting plane is passed through the axis as illustrated in Fig. 14*B*, the bolting bracket and one half of the rectangular outlet has to be cored. For the core to be set in the mold cavity, it must project up to the parting plane. This may be done with a core such as that shown in Fig. 14*C*. The core not only forms a part of the contour of the casting but also serves as a core print to support the center core shown in Fig. 14*D*.

Cores May Sag

If the casting is large, the print for the small opening may not have sufficient bearing surface and the core is likely to be misaligned by sinking down in the mold. A simple core as illustrated in Fig. 14E may be designed to serve this purpose as well as to form the boss. Such cores whose purpose is to support other cores are sometimes called setup cores. Fig. 14*F* shows the pattern containing the core prints for this molding procedure. When the pattern is drawn from the mold, the two setup cores are placed in position and the center core is set in. The drag half of the completed mold is shown in Fig. 14*G*.

If the parting plane were chosen as illustrated in Fig. 21*A*, there would be no difficulty in drawing the bolting bracket from the drag, but the entire rectangular outlet would have to be formed with a core such as illustrated in Fig. 21*B*. Although a setup core might be necessary when molded as in Fig. 14, there is no need for it here because

the center core gets vertical support from the print of the rectangular opening. The core is more complicated, and a decision as to the best method would involve an analysis in the cost of core production. The pattern and completed drag half of the mold are illustrated in Figs. 21*C* and 21*D*, respectively.

If a change in design were possible, the molding procedure might be simplified considerably. For example, if the flange on the rectangular outlet were omitted, the pattern could be cast in the position illustrated in Fig. 21*A* and no core would be required to form any exterior design. Another redesign which would simplify molding would be substitution of bosses for the bolting bracket, as in Fig. 23. If the metal has high volumetric shrinkage properties, objectionable defects may develop in the bosses. Methods of eliminating these defects may be more objectionable than the use of cores to form the exterior contours.

Cast-Weld Construction—Economy of production is an important factor in determining whether a part should be fabricated by welding, cast as one piece, or made by cast-weld construction. Welding and acetylene cutting are indispensable aids in foundry industries using a metal such as steel, which is very adaptable to these processes. Parts of castings requiring special physical characteristics may be cast with an alloy of most suitable metal and bolted, riveted or welded to other castings requiring different alloys.

The cast-weld construction process is applied to many types of steel castings varying from small to large intricate valves, gun-turret roller tracks, and other castings of all sizes. The cast-weld process may be conveniently employed in the construction of a steel casting such as illustrated in Fig. 14*A* by casting the flange of the rectangular outlet separately and then welding it to the casting.

Castings Incorporating Too Many Features—Too many features should not be incorporated in one casting. Not all parts are subjected to the same action, and the life of the casting is equal to that of the weakest part. Fig. 24 shows a chemical process casting with a 90-degree inlet elbow for introducing hot acid. The elbow was consumed by erosion long before the main body of the casting. Redesign for cast-weld construction eliminated the elbow and not only tripled the life of the casting but reduced the total production cost considerably by simplifying molding, coremaking and the cleaning proc-

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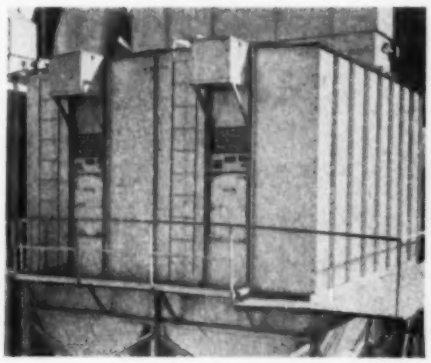

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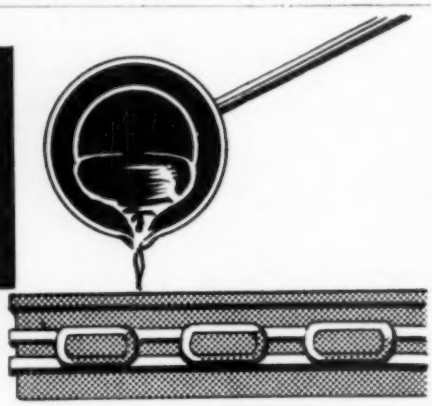

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esses. A special high-alloy elbow was cast to resist the hydraulic cutting action of the acid and assembled to the main casting by welding.

Features to Aid Finishing and Handling of Castings—It is not uncommon to neglect provisions on a casting for holding it in the machine during the finishing process. Also, accidents occur when large castings slip from their hitch when hoisted, because of lack of hitching facilities.

When a casting is to be machined to a close tolerance, it is often desirable to do as much finishing as possible without removing the piece from the machine. Fig. 19 shows a chucking extension on a casting which will permit the entire casting to be machined on a lathe with one setting, the last operation being the cut-off.

Castings with tapered sides are difficult to chuck in a lathe and if possible should be provided with pads or flats. Fig. 25 shows a conical-shaped casting with a threaded flange at one end. The redesigned casting has a cylindrical section for chucking.

If a casting of cylindrical or irregular contour is to be fastened to a machine table for finishing, it is often convenient to incorporate clampings on the casting. Fig. 20 illustrates lugs on the outside; however, it may be more desirable to cast them inside the casting.

Rolling, Crimping, Staking, and Forming—Complicated castings made of ductile metals may be cast in several pieces, and these parts may be assembled by rolling, crimping, or staking. Curved surfaces may be cast straight and formed to the desired curve after casting. Fig. 22 illustrates how a bead may be rolled over a disk to hold it in place in a malleable iron casting. Fig. 26 illustrates a malleable casting that has been crimped, and Fig. 27 one that has been staked. Small holes are sometimes punched rather than cored or drilled in small ductile castings.

Evolution of Design—Many present-day products contain castings that are the result of a long evolutionary process of experimentation.

Fig. 28A shows a casting originally made of three parts. The tool steel body was bored, and splines were milled on the outer surface. A flange was shrunk over one end of the body, and a bronze bushing containing an oil groove was pressed in. Because of a large number of failures, replacement of this part became a sizable item in the operating cost of the machine. After considerable study and experimentation, the flange and body were redesigned to

be made as a one-piece chilled casting. The former bronze bushing was replaced by a portion of a soft iron center core, which was used as a chill. The exterior of the casting, including the splines, was made with a dry sand core. This core was formed in, and drawn from, a stripping plate machine, since it was necessary that the casting be round and that the splines be uniform in shape and size throughout. Inside of the casting was formed cylindrically by a soft iron core and set in the mold, concentric with the outer dry sand core. This core chilled the casting effectively. In finishing, the core prints were sawed off, and a hole was drilled through the iron core and reamed to shaft size. Finally an oil groove was cut in the metal of the iron core for lubricating the shaft bearing.

Production Design—In the past, decisions on casting processes were left largely to the patternmaker. Now it is common practice in planning production of large castings or of small castings in large numbers to call a conference of the supervisory personnel of all departments having responsible interest in the job, including the design and production departments, pattern shop, foundry, machine shop, and finishing and assembly departments. They scrutinize the layout closely and make decisions co-operatively in the interest of the most economical way to carry the process through to completion. The routine used by some foundries in planning the pattern is as follows. (An oil-base colored pencil is used to note the decision on the blueprint.)

1. Determine parting line, cope, and drag.
2. Determine gating and feeding requirements.
3. Sketch core prints on the blueprint. Check possibilities of redesign to reduce the number of cores or to simplify them.
4. Sketch in loose pattern pieces on the blueprint.
5. Letter each core in the sequence in which it is placed in the mold.
6. Sketch outline of plate and flask around pattern, allowing sufficient room for gates and risers.
7. Provide written pattern specifications in detail, specifying pattern material, fixtures, driers and special plates.

After the pattern is made and the casting is produced and processed, another conference is called for further alterations, if necessary.

Use of Models—Costly new designs must be carefully planned to obtain the best results from expensive pat-

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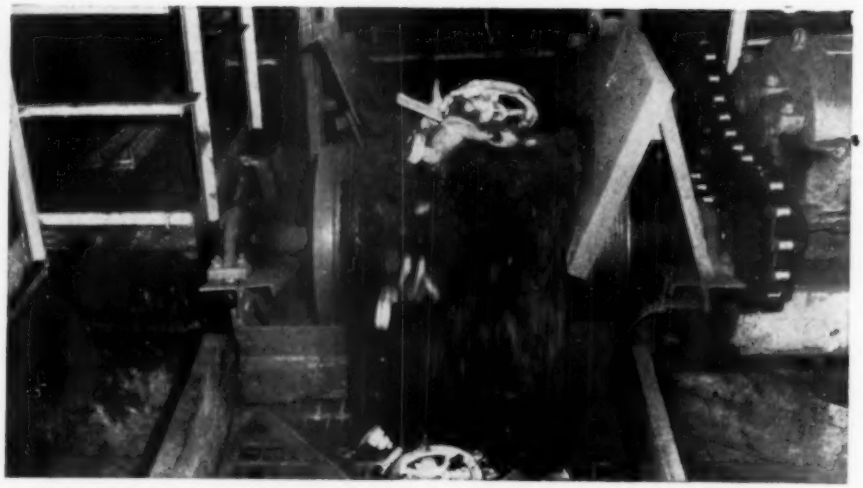

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tern equipment which is too costly to change when once made. In a complicated design it is often difficult to visualize the casting from the blueprint. Judgment in making various decisions may be erroneous because of misconception of the proportionality of the design or lack of consideration of some features unnoticed on the print. A model of the casting scaled down to a convenient size (say ¼ in. = 1 in. for medium-sized castings and 1 in. = 1 ft for large castings) is worth more than a hundred blueprints. If the model is closely scrutinized by experts in all the trades involved in its production (foundryman, patternmaker, metallurgist, welder, draftsman, and machinist), the most economical and best procedures will result. In spite of the time required to make the model, its use may decrease delivery time, reduce casting costs, and produce better castings.

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Book Covers Steel Casting Design

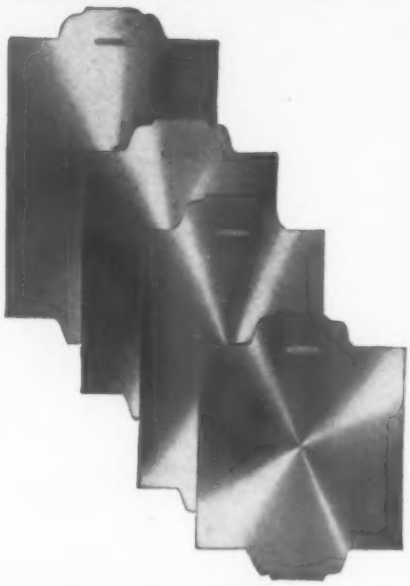
Steel Founders' Society of America has published a new booklet, "Fundamentals of Steel Casting Design." Prepared by Charles W. Briggs, technical and research director, as part of the society's educational program, the booklet covers fundamental practices useful to designer and foundryman. Emphasis is directed to reducing production costs, eliminating unnecessary weight, and improving casting quality and castability. Booklets, priced at 20 cents, may be obtained from F. Kermit Donaldson, executive vice president of the society, 920 Midland Bldg., Cleveland 15.

Book Review

Metals at High Temperatures, by Frances H. Clark, cloth, 372 pages, 6¼ x 9¼, published by Reinhold Publishing Corp., New York. Price $7.

This book is designed primarily to cover heat-resistant alloys and special alloy steels but includes other metals such as aluminum, lead and magnesium alloys. Text is introduced by a theoretical discussion on the plasticity of metals with special reference to high temperature effects.

Full discussion is devoted to the phenomenon of creep in metals and alloys and every effort has been made to include all the most relevant data on this important property. A section on test methods for metals at high temperature and current manufacturing methods for heat resistant alloys is included.



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The Castings Industry and the Munitions Board

(*Continued from page* 101)

emergency to justify their acquisition prior to such an emergency. These materials constitute a reserve of such items as aluminum, asbestos, beryl, cobalt, columbium, cordage fibers, industrial diamonds, manganese, mica, nickel, tin, tungsten, and zinc. The present objective of the total stockpile program amounts to about $4 billion. The total value of the stockpile now exceeds $1½ billion with another half million dollars worth of materials on order. Delivery of the materials on order added to those now on hand would bring the stockpile up to about 50 per cent of completion. The actual procurement of materials for the stockpile is a function performed by the General Services Administration, not by the Munitions Board.

Preserve National Reserves

A second statutory responsibility of the Munitions Board is the supervision of the preservation of our national reserves of machine tools and war plants. Under the Industrial Equipment Reserve Program, policies and procedures have been developed for the processing, storage, and inspection of equipment and procedures for eliminating obsolete items from the reserve. There are approximately 10,000 pieces of industrial equipment in the National Industrial Reserve and about 143,000 pieces in the reserve of the Department of Defense. In the war plant reserve program there are approximately 470 plants whose cost was approximately $7.8 billion. Of these, approximately 200 are in the National Industrial Plant Reserve and the remainder in the Department of Defense reserve.

As a staff agency, the Munitions Board does *not* engage in procurement; rather its function is to formulate the policies and procedures under which the three military departments (Army, Navy and Air Force) operate. Neither the generation of military requirements nor the scheduling of military production is performed by the Munitions Board. The three departments perform these functions.

To avoid some of the overlapping and duplication resulting from independent procurement by all three departments, the policy of single service procurement has been established wherever feasible. Under this program, one of the three departments

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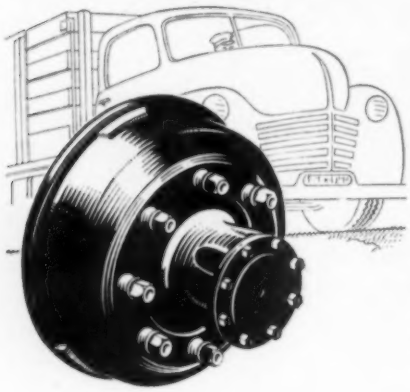

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is assigned the procurement responsibility for all three departments; for example, Air Force procures all aircraft, the Ordnance Department procures all trucks, the Navy procures all hand tools. Along with this concept of single service procurement is the industrial capacity allocation program. This program is aimed at the allocation of the productive capacity of plants or industrial corporations with the co-ordination of a representative of a single service rather than with representatives from all three departments.

Under this plan the attempt is made to assign to the department with dominant interest the responsibility for co-ordinating all military plans for the use of an individual plant. It names a military representative to be the spokesman for both his own and the other departments. These officers are known as Armed Services Procurement Planning Officers, or ASPPOS. They are the direct contacts of the military with the individual plants and factories.

I realize that the foregoing has been a somewhat sketchy survey of the organization and functions of the agencies, particularly the Munitions Board, involved in industrial mobilization planning. Many activities have not even been mentioned, and others only touched upon. A thorough-going analysis of any one of the activities would consume much more time than would be justified. Our primary consideration is the relationship of your industry to the Munitions Board. In that connection I should like to point out the relationship of the steel casting industry to industry as a whole. Military procurement, in general, is confined largely to so-called "end-items." There is relatively little direct procurement on the part of the military services of components or semiprocessed items. Essentially, as you well know, the foundry industry is a producer of components or parts that enter into the manufacture or production of the end items procured by the military services. It is recognized that a number of the difficulties that your industry experienced during the last war were the result of the time lag between initial prime contracts and the placement of requirements upon the foundry industry as component manufacturers. It is the recognition of such facts that has led to many of the policies affecting planning for any future mobilization.

I am sure that you would like me to tell you the precise magnitude of the military requirements for steel castings, direct and indirect. How-

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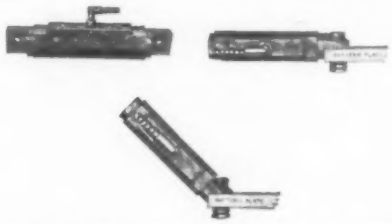

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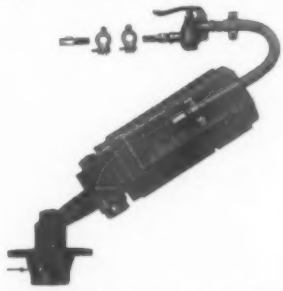

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ever, I am equally sure you realize that this is not now possible, and that it will probably not be possible as long as we remain at relative peace.

You are also anxious to know under what conditions of government regulation you would be producing during a future emergency.

I can give one general answer to each of these questions: It is my belief, on the basis of what I have heard and read, that a future emergency would be total in nature. It would require full mobilization of our nation's industry, the fullest use of our manpower. There would be tight controls, comparable to those at the height of World War II. And production would need to be sustained at levels achieved at the height of World War II production.

It rests with you, and with other segments of industry, to consider now what problems you would face, under these conditions.

President Has Authority

The Defense Production Act of 1950 gives the President of the United States certain broad authority in connection with regulation and control of the economy under what we might call "semi-emergency" conditions as they exist today. By executive order these authorities have been delegated to the major agencies of the government. Stuart Symington, chairman of the National Security Resources Board, has been charged with the overall co-ordination of these activities. Under authority of this executive order the Department of Commerce is in the process of establishing the National Production Authority under W. H. Harrison to perform certain functions of allocations, priorities and control. The Department of Interior has been charged with responsibilities pertaining to fuels and minerals.

Obviously, it is to the mutual advantage of industry and the Munitions Board if the board is consulted in advance on appropriate problems so that bottlenecks can be anticipated and eased in advance, and so that no needless barriers stand in the way of future war production.

In addition, the Munitions Board needs the assistance of industry all through its programs. In developing material requirements, it needs advice from industry as to how such requirements are computed and correlated. You have already participated in this requirements program, by giving the board information as to your own industrial capacities.

For the Munitions Board to pursue realistic planning objectives, as those

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CORE HARDNESS TESTER

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Each of these testing units was designed to conform with the recommendations of the Committee on Foundry Sand Research of the American Foundrymen's Society.

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objectives affect industry, there have been established Industry Advisory Committees composed of representatives from the various segments of our national economy. These committees serve the function of providing the Munitions Board with expert advice on the capabilities and limitations of industry and its requirements, in terms of materials and manpower, to achieve the production required in the event of a major emergency. There are, for example, committees on additive alloys, aluminum and magnesium, antibiotics and biologicals, a chemical committee with 15 subcommittees running the gamut from alkalies to explosives, fats and oils, plastics and solvents. There is a committee on fibers and synthetic fibers and silk, an iron and steel committee with six subcommittees, a committee on rubber with three subcommittees.

Represent Foundry Industry

The foundry industry is well represented with a parent committee and 11 subcommittees. These subcommittees are on aluminum and magnesium castings, brass and bronze castings, cast armor plate, cast iron pipe, foundry equipment, foundry supplies, gray iron castings, malleable iron castings, steel castings, high alloy castings and a technical subcommittee. This group of committees has been one of the most active and effective groups of committees on the list. It is through the agency of these committees that the principal liaison between the industry and the Munitions Board is conducted.

Frank G. Steinebach is chairman of the parent committee and T. H. Shartle is chairman of the subcommittee on steel castings. Other members of the subcommittee are N. K. Anderson, A. M. Andorn, M. A. Fladoes, B. P. Hammond, C. L. Harrell, C. L. Heater, E. L. Hodge, S. J. Moran, H. D. Phillips, F. M. Robbins, and V. E. Zang. A. J. McDonald is chairman of the Cast Armor Plate Subcommittee and the other members are G. F. Driemeyer, M. F. Fladoes, D. P. Murphy, L. L. Phelps, M. G. Sternberg and W. F. Wilson.

A joint meeting of the Steel Castings and Cast Armor Subcommittees was held in Washington June 15 to initiate studies leading to recommendations on mobilization planning. With the experience of World War II as a background, the anticipated problems of the industry in the event of a major mobilization were discussed. The Steel Founders' Society furnished several excellent studies made by the society with reference to manpower, materials requirements,

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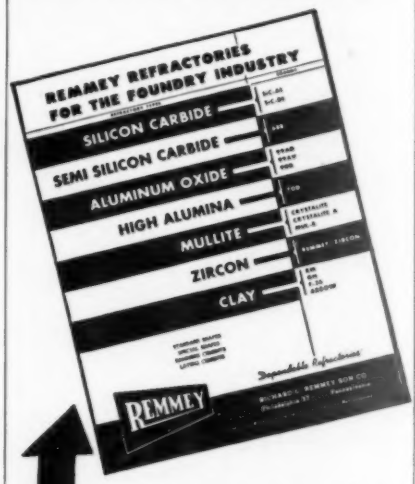

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and production capacities. Kermit Donaldson, executive vice president of the Society, attended this meeting and provided valuable advice and assistance.

Under the subject of manpower, the committee considered:

1. Effects of losses to the military services and other industry
2. Use and effectiveness of women
3. Effectiveness of labor imported from Jamaica, Puerto Rico and Mexico
4. Effectiveness of various age groups and
5. Man-hour requirements in terms of production.

In discussing the subject of raw materials it was pointed out that lack of adequate manganese and scrap impeded production during the last war. It was noted that new specifications, particularly those involving high alloys, would result in higher requirements for materials such as nickel, chrome, tungsten, manganese, etc. Some of the difficulties to be anticipated as a result of some of the new specifications—for example, performance under subzero temperatures—were highlighted.

The committee decided to recommend a survey on the productive capacities and manpower and materials requirements of the industry in order to further develop recommendations in connection with mobilization planning. This survey now is in process, and as of Sept. 24 we have received 232 returns from a mailing list of 307

In a similar survey conducted in the malleable foundry industry just completed, returns on the questionnaire were 100 per cent.

At a meeting of the parent foundry committee on Aug. 22, status reports of all the subcommittees were submitted. The committee decided to set up a subcommittee on manpower, with membership from top management and industrial relations departments. The purpose of this subcommittee is to make a further study of the manpower problems of the industry. A resolution was passed to offer the services of the foundry committees of the Munitions Board to Secretary Sawyer and the Department of Commerce.

As an example of the activities of this committee I should like to quote from the minutes of the August meeting:

"Manpower shortages, stemming chiefly from three sources, provided the greatest problem of the foundry industry during World War II. First, lack of uniform draft regulations on a national basis and absence of men with industrial background on a large

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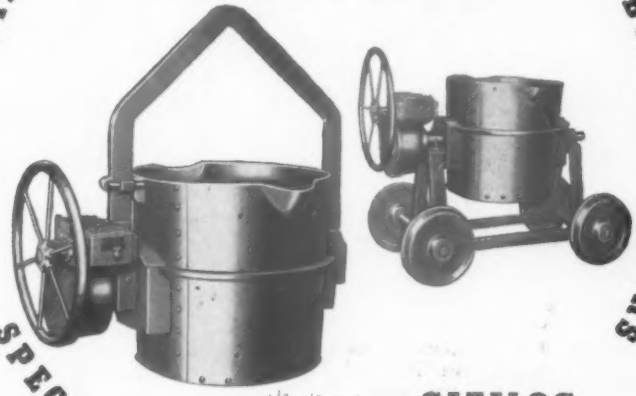

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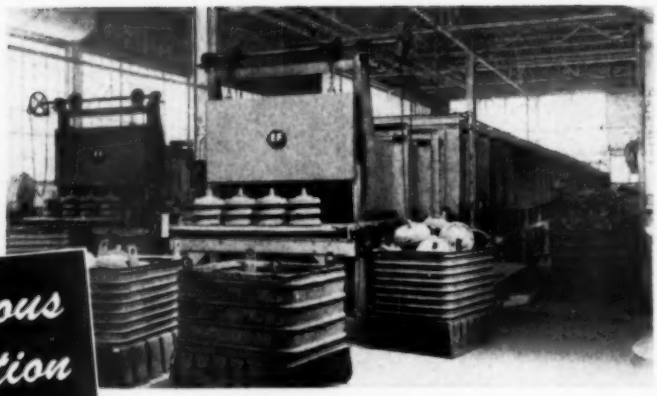

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number of local draft boards produced many injustices in deferments. Secondly, pirating of labor by the glamour industries or by prime contractors receiving government blessings to pay above the going labor rates in the district depleted the supply of workers from basic producers, such a foundries. Last, but perhaps not least, while the military did recognize the need for steel castings from the beginning, the necessity of having malleable iron or gray iron and nonferrous castings was not realized until over a year after the war started and after many plants had been closed and workers scattered to other fields. If foundries are to meet future demands of the military and at the same time produce castings for at least essential civilian needs, the government must recognize that manpower controls are as important as the scheduling of materials or the control of wages and prices. Study should be given to the problem and at the same time uniform draft regulations governing occupations deserving exemption should be provided immediately.

Raw Material Difficulties

"All types of foundries encountered a great amount of difficulty in securing much needed raw materials and supplies during the past war, due largely to the fact that the importance of the industry was not recognized and suitable facilities were not provided by the war agencies to handle foundry procurement problems. Unless the problems of the foundry industry are approached from an over-all standpoint, materials will not be apportioned to the best advantage of the war effort and substitution of materials within the industry cannot be properly organized. In any emergency set-up, the foundry industry should not be combined with any other industry, as was the case in the War Production Board, but should be established separately with individuals heading the different functions who are familiar with the industry, its problems and its potentialities, and who have the confidence of the industry.

"As mentioned before, the industry will not be able to serve the nation to best advantage unless the military has a better idea of its needs and recognizes the many ramifications of castings in the production of war material. While it is recognized that such advance planning is difficult, it is believed that same thought must be given to the subject if industry is to maintain its plants on a basis which will permit the meeting of fluctuating requirements of the mili-

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tary and the related war agencies.

"Members discussed the implication of these three concepts and decided to adopt them as the official viewpoints of the committee."

You understand, of course, that these minutes go to Commerce, NSRB and other interested agencies.

In all of this work the trade associations have been of great help and have been very co-operative, and their assistance is very much appreciated.

The expert advice of our Industry Advisory Committees has been most valuable to the Munitions Board in its planning efforts and the co-operation of the individual companies has contributed materially to the cause of national security.

Speaking Made Easy for Engineers

To help engineers become better speakers, a practical pocket size manual, "Speaking Can Be Easy," has been prepared by the American Society for Engineering Education through its committee on relations with industry. The manual, which can be read through in 30 minutes, is illustrated in a humorous vein to emphasize major points. Check lists for both the speaker and meeting chairman provide help for improved execution of their respective responsibilities. Carefully selected references for additional help on various phases of speech psychology and effective speaking are included. The manual, which was prepared by outstanding men in industry, education and professional engineering, may be secured from the Engineers' Council for Professional Development, 29 West 39th St., New York 18, at fifty cents per copy.

Book Review

ASTM Specifications for Steel Piping Materials, 320 pages, 6 x 9 in., published by the American Society for Testing Materials, Philadelphia 3. Price $3.

Including some 50 widely used specifications relating to steel piping materials, this latest compilation of ASTM as of December, 1949 relates to pipe used to convey liquids, vapors and gases at normal and elevated temperatures; still tubes for refinery service; heat exchanger and condenser tubes; boiler and superheater tubes as well as related materials such as castings, forgings, bolts and nuts. It also contains Grain Size Standard E 19 and American Standards covering steel and iron pipe (B 36.10) and stainless steel pipe (B 36.19).

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With the EDITORS

WASHINGTON: According to *Newsweek,* some industrialist is reported to have remarked, after pounding the pavements of the capital in a vain effort to find out present trends in the defense effort, that "the confusion does not seem to be as well organized as the last time." After spending days visiting various departments of the government, one comes away with the impression there are too many cooks trying to save the broth, and that a simpler basic organization may be necessary before industry can begin to function with maximum efficiency.

—o—

Travel: Just why foundrymen hold so many meetings remains a mystery. Some day we are going to figure out the total man-hours devoted to foundry meetings, and we'll probably come up with a figure resembling the public debt. Fall seems to offer the greatest attraction for that get-together feeling, and of course the editors try to attend as many as possible, just to keep you informed with what is going on in the industry. Back in late September, Bob Herrmann journeyed to Hamilton for the All-Canadian Foundry Conference. Bill Gude reported the symposium on nodular or ductile iron at Swampscott, Mass., and the industry meeting of the Malleable Founders' Society in Cleveland during September. He then toured Texas the first week in October, seeing the Texas-Purdue game at Austin, spending two days at Lufkin obtaining information for several articles which will appear in early issues, and reporting the Texas Regional Conference at San Antonio. Bill also covered the annual meeting of the Gray Iron Founders' Society in Cincinnati Oct. 12-13.

Ed Bremer spent a pleasant two days with the group of French founders visiting plants in the United States. Ben Price attended the annual meeting of the Non-Ferrous Founders' Society in Boston which was also held Oct. 12-13. The editor attended the annual fall meeting of the Steel Founders' Society at Hot Springs, Sept. 25-26; the annual meeting of the Foundry Equipment Manufacturers' Association at the White Sulphur Springs, Va., Oct. 13-14, and spoke before the Central Indiana Chapter at Indianapolis, Oct. 2. Just to get a change of scenery, Ben Price and the editor attended a two-day conference of the Society of Business Magazine Editors in Washington, Sept. 21 and 22.

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Movie: Thanks to Lew Zender, the genial public relations director of the American Steel & Wire Co., a group of Cleveland editors recently was privileged to view the new United States Steel color and sound movie "Building for the Nations." This is a beautiful job recording photographically the designing, fabrication and erection of the Secretariat Building of the United Nations in New York. Information on the availability of this film may be obtained from the Film Distributing Center, American Steel & Wire Co., Cleveland.

—o—

Public Relations: Thanks to Belle City Malleable Iron Co. for a copy of the new booklet "Welcome to Belle City." Visitors to your plant should delight in having this information on personnel, product and facilities. Incidentally, we hope that all foundries will keep us informed on their public relations program.

—o—

Get Out the Vote: Nov. 7, 1950 may be one of the most important days in the history of this nation. For on that day we will decide if we are to be governed by selfish minorities, or if all of the people will express their desires at the polls. Every believer in the free enterprise system should do everything possible to get out the vote.—F.G.S.

When sales representatives of the Universal Engineering Co. met in Frankenmuth, Mich., Business Manager George Pope and the editor attended one session and had the pleasure of inspecting that firm's manufacturing facilities

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Michigan Conference Program Announced

New trends in foundry development will be the featured theme of the annual Michigan Foundry Conference, to be held at Michigan State College, East Lansing, Mich., Nov. 10-11. As in former years the conference is sponsored by the school's Department of Mechanical Engineering and the four Michigan chapters of the American Foundrymen's Society.

A comprehensive program of papers and discussions has been arranged by the planning committee under the chairmanship of C. C. Sigerfoos, associate professor, Mechanical Engineering Department, and Austen J. Smith, head of the Metallurgical Engineering Department, Michigan State College. A luncheon, banquet and football game between Michigan State College and University of Minnesota will furnish the conference entertainment.

Detailed program follows:

Friday, Nov. 10

8:30 a.m.—Registration
9:15 a.m.—Address of welcome, L. C. Price, head, Department of Mechanical Engineering, Michigan State College; Lorin G. Miller, dean, School of Engineering, MSC
9:30 a.m.—"Trends in Foundry Education," B. D. Claffey, president, Acme Aluminum Alloys Inc., Dayton, O.
11 a.m.—"Basic Cupola Operation and Practice," S. F. Carter, assistant melting superintendent, American Cast Iron Pipe Co., Birmingham
2 p.m.—Foundry Air Pollution Panel Discussion: Co-ordinator, Thaddeus Giszczak, AFS Cupola Research Committee, Detroit; Meterological, A. H. Eichmeier, meterologist, U. S. Weather Bureau, East Lansing, Mich.; Plant Life and Pathology, Prof. Forrest Strong, Department of Botany and Plant Pathology, MSC; Public Health, K. E. Robinson, ventilation engineer, Michigan Department of Health, Lansing; Testing Procedures, R. G. Smith, industrial hygienist, Bureau of Industrial Hygiene, Detroit; Control Equipment, J. M. Kane, American Air Filter Co., Louisville; Legal Obligations, Mr. Giszczak
6:30 p.m.—Dinner and entertainment: "Activities of American Foundrymen's Society," Walton Woody, national president; "Public and Industrial Relations in European Industry," C. W. Otto, executive secretary, Chamber of Commerce, Lansing.

Saturday, Nov. 11

9 a.m.—"Fluid Flow and Gating," Color film of American Foundrymen's Society
10 a.m.—Progress Report on Foundry Research, H. L. Womochel, Department of Mechanical Engineering, MSC
10:45 a.m.—"Gating and Fluid Flow," W. H. Johnson, Naval Research Laboratory, Washington
2 p.m.—Football game—Macklin Field Stadium, Michigan State College vs University of Minnesota

Metal Treating Journal

Publication of a monthly magazine *Metal Treating* has been announced by the Metal Treating Institute, New Rochelle, N. Y. The magazine is designed to be of interest to key management and operating personnel of commercial heat treating organizations and to further the art and industry of commercial heat treating.

7 WAYS SAND CONTROL SAVES MONEY

Use NEWLY DEVELOPED TEST VALUES

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Green Strength
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Flowability
Moisture
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2 EASIER CORE MAKING
Green Strength
Blowability
Sagging Resistance
Cracking Resistance
Stickiness
Moisture

3 BETTER MOLD CONDITION
Green Hardness
Air Set Strength
Dry Strength

4 BETTER CORE CONDITION
Dry Hardness
Core Strength
Core Deflection
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...TRADE PUBLICATIONS...

For More Details on these Items Use Reply Card—Page 237

FILING SYSTEM: Remington Rand Inc., 315 Fourth Ave., New York 10—Booklet LBV 396 charts the life cycle of a file, beginning with the origin of a record, whether internal or external, then progressing through indexing, the file housing and protection, and charge-out, to the retention or transfer of the record, including the use of microfilming equipment.
For More Details Circle No. 90—Page 237

INDUSTRIAL TOOLS: Dumore Co., 1300 Seventeenth St., Racine, Wis.—Illustrated catalog 50 on tool-post grinders, hand grinders, flexible shaft tools, high-speed quills and high-speed drilling equipment contains charts and instruction tables on selecting the proper combination of grinder and quill for a job.
For More Details Circle No. 91—Page 237

LIGHTING FIXTURE HANGERS: Thompson Electric Co., 1101 Power Ave., Cleveland 14—Catalog 50, superseding previous issues, contains general and detailed information, including specifications, on the standard line of company disconnecting and lowering lighting fixture hangers, accessories, special devices, and parts.
For More Details Circle No. 92—Page 237

BRONZE ALLOYS: American Smelting & Refining Co., 120 Broadway, New York 5—Booklet on copper-silicon bronze alloys contains suggestions for typical applications. Properties of corrosion resistance and machinability are set forth, and physical properties for the two types of alloys are tabulated.
For More Details Circle No. 93—Page 237

SPACE HEATERS: Arthur A. Olson & Co., Canfield, O.—Bulletin A1A No. 30-B-1 describes gas, oil and stoker-fired warm air heaters for heating and ventilating industrial and commercial buildings. They also may be used for process work and for make-up air applications.
For More Details Circle No. 94—Page 237

MOTORS: Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10—Bulletin C-2001 covers design, construction, selection, ordering information, and frame dimensions for type "T" heavy duty, constant and adjustable speed direct current motors of ¾ to 1000 hp.
For More Details Circle No. 95—Page 237

MAINTENANCE EQUIPMENT: McNally Pittsburg Mfg. Corp., Pittsburg, Kans.—Catalog 550 covers babbitted journal boxes, roller bearing pillow blocks, centrifugal slurry pumps, water valves, conveyor take-ups, roller holdbacks, and perforated steel screen plates. Specifications are included on conveyor and drive pulleys, V-belt sheaves, gears, sprockets, shafts, and keys.
For More Details Circle No. 96—Page 237

CORES: Archer-Daniels-Midland Co., Werner G. Smith Co. Division, 2191 West 110th St., Cleveland 2—Bulletin discusses sands, moisture, and binders. Their effect on cores is considered from the point of view of baked strength, green strength, hardness, and bakability.
For More Details Circle No. 97—Page 237

FLOOR RESURFACER: Stonhard Co., 500 Stonhard Bldg., Dept. F, 1306 Spring Garden St., Philadelphia 23—Folder describes application of a compound for patching or resurfacing all types of floors, runways, platforms, etc.
For More Details Circle No. 98—Page 237

GAS HEATERS: Automatic Gas Equipment Co., 301 Brushton Ave., Pittsburgh 21—Folder deals with gas unit heaters featuring cast iron heat exchangers. Specifications are included for sizes from 85,000 to 215,000 Btu per hr.
For More Details Circle No. 99—Page 237

AIR HOSE: Hewitt Rubber Division, Hewitt-Robins Inc., 240 Kensington Ave., Buffalo 5—Bulletin 129 explains design, construction and rubber compounds of a general service air hose with rayon cord carcass.
For More Details Circle No. 100—Page 237

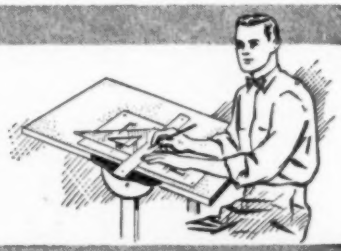
AIR TRAPS: Armstrong Machine Works, Three Rivers, Mich.—Illustrated bulletin 202 covers selection and installation of air traps for automatic drainage of moisture from compressed air intercoolers, aftercoolers, receivers, separators, and drip points.
For More Details Circle No. 101—Page 237

STORAGE METHODS: Frick-Gallagher Mfg. Co., 401 Shubert Bldg., Philadelphia 2—Folder 220 describes and illustrates 25 types of storage equipment and 18 accessories. Savings in storage floor space and manpower requirements are explained.
For More Details Circle No. 102—Page 237

REFRACTORIES: Laclede-Christy Co., 200 Iroquois Bldg., 3600 Forbes St., Pittsburgh 13, (J. S. Marsh Jr.)—Bulletin 128A covers the company's line of refractory products and contains application information and other reference data.
For More Details Circle No. 103—Page 237

SAND MIXERS: National Engineering Co., 608 Machinery Hall Bldg., Chicago 6—Bulletin 503 suggests ways of bringing old company

DESIGNERS AND BUILDERS OF SPECIAL FOUNDRY MACHINES...



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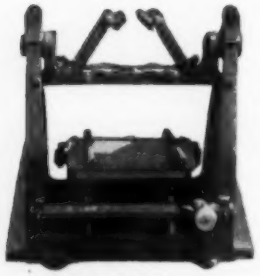

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  This job consisted of 4 special power-rollover-power draw-roll out units for installation on a turn table with sand-slinger operation. For making heavy-duty, steel truck wheel drag molds. Results—extreme accuracy of molds and considerable saving in labor.
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For More Details Circle No. 104—Page 237

OIL BURNERS: Anthony Co., 47-33 Fifth St., Long Island City 1, N. Y. —Catalog 501 contains dimensions, capacity tables, shutter and support data plus layout and installation illustrations of the company's oil burners.
For More Details Circle No. 105—Page 237

AIR CLEANER: Selas Corp. of America, Erie Ave. & D St., Philadelphia 34—Folder gives information on operation and performance of a filter for removing water, water-oil emulsions, and dirt from compressed air or gas lines.
For More Details Circle No. 106—Page 237

MOLDING MACHINES: Johnston & Jennings Co., Division of Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39—Folder illustrates and describes company's improved line of molding machines.
For More Details Circle No. 107—Page 237

BONDING MORTAR: E. J. Lavino & Co., 1528 Walnut St., Philadelphia 2—Bulletin D-117-A explains the composition, properties, and applications of a chrome-base bonding mortar for refractory brick.
For More Details Circle No. 108—Page 237

COMBATING RUST: Oakite Prodcts Inc., 22 Thames St., New York 6 —Service report suggests specialized materials and procedures for combating rust throughout the production process in metalworking plants.
For More Details Circle No. 109—Page 237

BELT CONVEYORS: Barber-Greene Co., 631 West Park Ave., Aurora, Ill.—Catalog lists conveyors offered and explains the selection and laying out of belt conveyors.
For More Details Circle No. 110—Page 237

ABRASIVE HONES: Mid-West Abrasive Co., Owosso, Mich.—Folder describes hones made by the company and offers tips on proper selection of hones.
For More Details Circle No. 111—Page 237

OIL SEALS: Johns-Manville, 22 East 40th St., New York 16—Handbook contains data on construction, application, and installation of the company's oil seals.
For More Details Circle No. 112—Page 237

WELDING: Welding Equipment & Supply Co., 223 Leib St., Detroit 7—Catalog, covering company tool and die welding electrodes, contains data on metallic arc tool steel welding.
For More Details Circle No. 113—Page 237

LUBRICANT: Acheson Colloids Corp., Port Huron, Mich.—Bulletin 423 discusses colloidal graphite as a high-temperature lubricant and cites its use in typical installations.
For More Details Circle No. 114—Page 237

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VIBRATORY FEEDERS
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Flow Solids... ...Like Water

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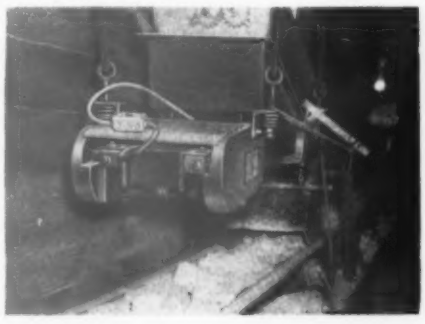

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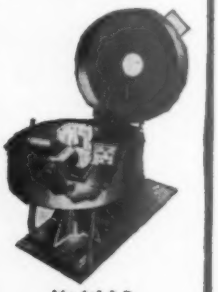

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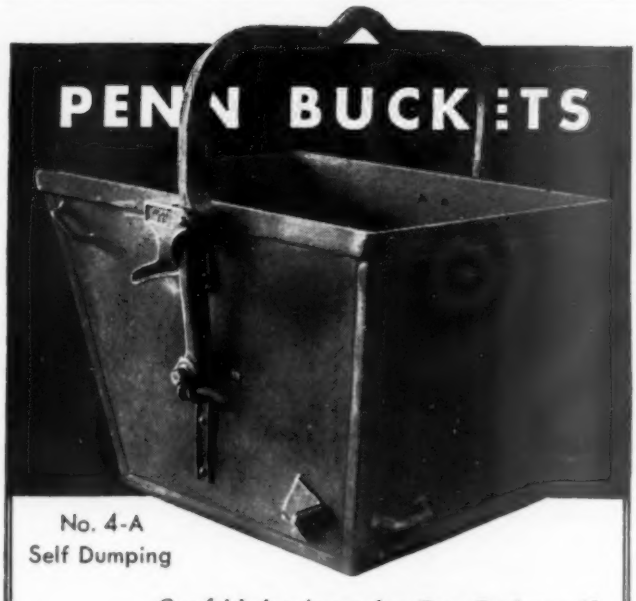

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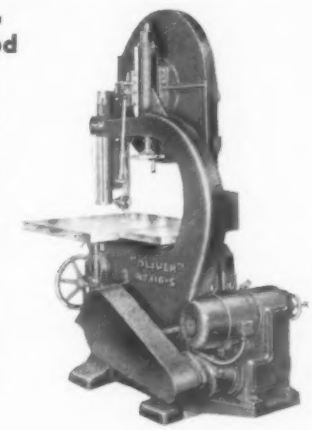

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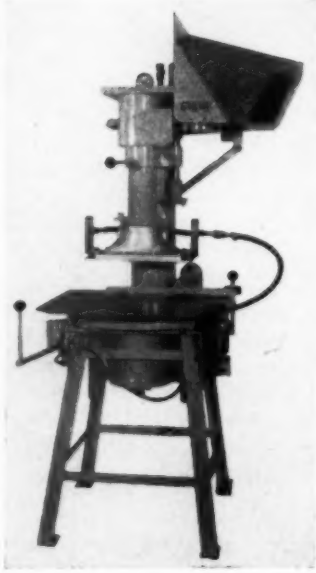

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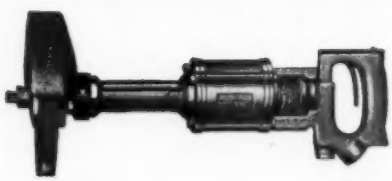

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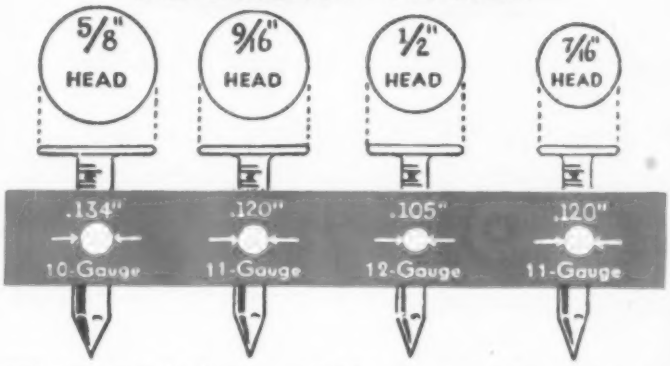

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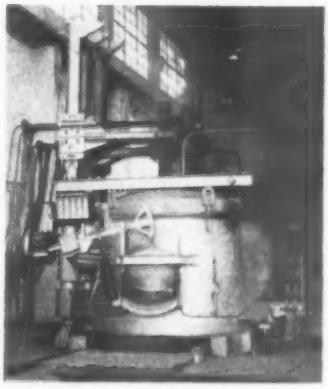

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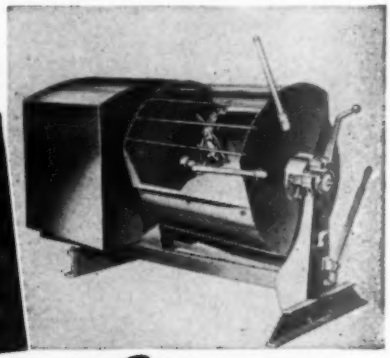

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Date .....

Equipment or products we are now handling .....

.....

We would be interested in handling the following lines: .....

.....

Territory we now cover regularly: .....

..... Number of salesmen we employ: .....

We would appreciate being included in your new list and referring us to any manufacturers of the above equipment or producers of supplies who are seeking additional representatives.

NAME: _____

ADDRESS: _____

CITY: _____ ZONE: _____ STATE: _____

AMASTEEL.....!

For low cost cleaning

- AMASTEEL is the blast cleaning material that is engineered for the job.
- AMASTEEL assures the lowest cleaning cost.
- AMASTEEL lasts many times longer. Investigate!
- AMASTEEL provides peak efficiency in shot for blast cleaning and peening. Developed by the maker of "PEENBLAST", "CLEANBLAST" and "ALLOY 99".

Abrasive for any and all kinds of work.

PRODUCERS OF
PEENBLAST
CLEANBLAST
ALLOY 99

ALLOY METAL ABRASIVE CO.
311 WEST HURON ST. ANN ARBOR, MICH.

MAUGHLIN
PATTERN LETTERS AND MONOGRAMS

A Hammer Blow Secures Letters To Pattern

The Maughlin Pattern Letters are made of hard aluminum alloy to withstand severe usage and have a number of points on the underside so they can be attached permanently to the pattern.

Industries of the United States and Foreign Countries are using Maughlin Pattern Letters With The Points. Some, who formerly cast their own letters of lead, have found it to be much more economical to use the Pattern Letter With The Points.

Our facilities for making special dies for Monograms & Trade Marks are of the finest, enabling us to quote you extremely low prices.

The COST of the Pattern makers time alone applying lead letters to a pattern, EXCEEDS the cost of the Maughlin Pattern Letter.

Large Stock Carried assuring immediate delivery.

THE H. P. MAUGHLIN CO.
953 Ingleside Ave., Columbus, Ohio

Manufacturers of letters and numbers exclusively for over 30 years

A BLAST FURNACE PRODUCT

Smelted from Superior quality lake ores, high grade metallurgical coke and limestone, using our own local No. 1 Sharon Seam coal.

HIGH SILICON IRON JISCO

A "blend" with JISCO is sound metallurgy.

THE JACKSON IRON & STEEL *Company*
JACKSON, OHIO

"BABY" THOSE CORES

with CMD

PNEUMATIC CORE TRUCKS

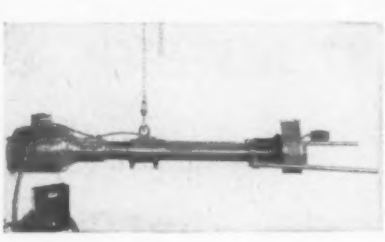
The resilient construction of CMD Pneumatic Core Trucks absorbs all shocks and bumps—protects cores from costly chafing and breaking, carries them as gently as a baby carriage. Pneumatic tires and *exclusive* inner coil springs in the upright supports assure fast, safe transporting of cores from the core room to the foundry.

MODEL A-27 (illustrated above) Carries heavy loads easily. Has heavy duty elliptical springs, inner coil springs (in the upright supports) and pneumatic tires. Sizes: 27" x 60", 1000 lbs. capacity; 27" x 72", 1,200 lbs.; 27" x 84", 1,400 lbs. Other models available to meet the needs of every foundry; with capacities from 500 lbs. up.

Write today for FREE circular 1150-F on CMD Core Trucks, Barrows and other foundry specialties.

CMD

CHICAGO MANUFACTURING & DISTRIBUTING CO.
1928 West 46th Street **Chicago 9, Illinois**



MARSCHKE SWING FRAMES ARE DIFFERENT!

Size for size, Marschke Swing Frame Grinders are *heavier* than any other machine on the market. This extra weight is no accident—it's there—in the right places—to eliminate *vibration*, the "wheel eater". Marschke swing frames give you better two-way balance . . . smoother spindle rotation: bearing seats are *precision ground and honed* to assure perfect spindle alignment and bearing fit.

These are only a few reasons why Marschke grinders are the best money can buy.

An inquiry will bring you interesting data.

VONNEGUT MOULDER CORPORATION
1839 MADISON AVENUE • INDIANAPOLIS 25, INDIANA

Precision

CORE BOX VENTS

Here's part of a complete line of DEMMLER core box vents—rigidly constructed in varying sizes of slotted brass—slotted steel—and screen mesh. Orders filled promptly from stock.

BRASS SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

STEEL SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

SCREEN TYPE CORE BOX VENTS
Mesh: #30, #40, #50.
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

SPECIFICATION CIRCULAR ON REQUEST

Wm. **DEMMLER** *& Bros.*
Kewanee, Illinois

There's a Complete Line of CASTMASTER Die Casting Machines

HIGH SPEED PRODUCTION MODELS FOR PRODUCING SMALL TO THE LARGEST SIZE CASTINGS!

Precision Built by Die Casting Engineers

● Cast-Master Die Casting Machines are designed and built by engineers with years of experience in the Die Casting Industry. Each model has been given months of actual operation under the most severe conditions.

All Cast-Master Models Can Be Converted From Cold Chamber to Gooseneck!

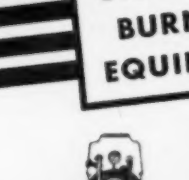
MILLER•TAYLOR TOOL CO.
5005 EUCLID AVENUE • CLEVELAND 3, OHIO

Send for COMPLETE ILLUSTRATED CATALOG

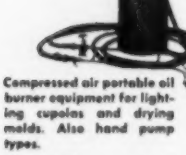
HAUCK OIL AND GAS BURNING EQUIPMENT

for
- CUPOLA LIGHTING
- MOLD DRYING
- LADLE HEATING
- CORE BAKING
- FURNACE HEATING

Featuring
3 BIG OPERATIONS WITH 1 EQUIPMENT

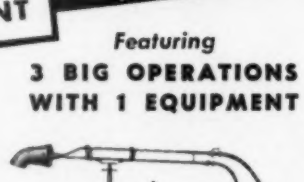


Compressed air portable oil burner equipment for lighting cupolas and drying molds. Also hand pump types.



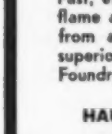
Venturi compressed air "suction" hand torches — no preheating, for drying linings, cores, molds.

Portable venturi high pressure oil burners with adjustable burner stand for heating and drying ladles.

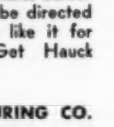


This Hauck All-Purpose Unit with interchangeable Burners and Nozzles, lights cupolas, heats ladles, dries molds. Fast, efficient—easy to handle. Burner flame adjustable and can be directed from any angle. Nothing like it for superior performance. Get Hauck Foundry Catalog.

HAUCK MANUFACTURING CO.
106 Tenth St., Brooklyn 15, N. Y.

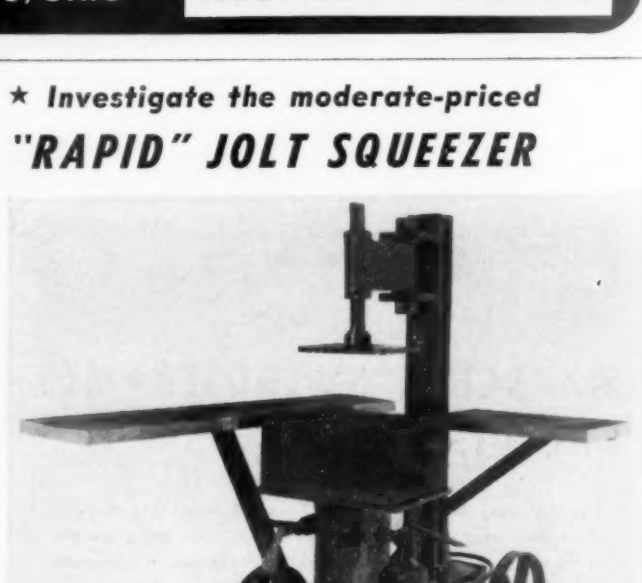


Venturi low pressure and high pressure air atomizing oil burners for ladle heating, core and mold ovens, melting and annealing furnaces.



★ *Investigate the moderate-priced*

"RAPID" JOLT SQUEEZER



*Pioneer has satisfied hundreds of cost-conscious foundrymen with moderate-priced, efficient portable jolt and hand squeezers. Write for Bulletin "F".

PIONEER MFG. CO.

Molding Machine Manufacturers for Over 20 years

MILWAUKEE (WEST ALLIS) WISCONSIN

THE WEATHER
Today: Snow and colder
Tomorrow: Snow and colder

AVOID FROZEN SAND TROUBLES THIS WINTER

INSTALL A NICHOLS SAND RECLAMATION SYSTEM – AND SAVE!!!

1.... No handling of Frozen Sand.

2.... No outdoor Sand Storage.

3.... No waiting for Delayed Sand Deliveries.

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WELDED AND BOLTED TYPES • ALL SIZES • COMPLETE CONTROL EQUIPMENT • 26 YEARS A LEADER IN MAGNETIC MATERIALS HANDLING.

THE OHIO ELECTRIC MFG. CO. • 5900 MAURICE AVE. • CLEVELAND 4, O.
Associate Member Institute of Scrap Iron and Steel, Inc.
A-2787

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EDWIN S. CARMAN, INC.

LEE ROAD AT MAYFIELD
CLEVELAND 18, OHIO

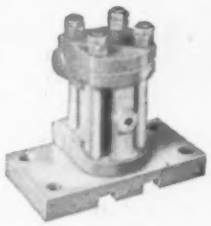
A COMPLETE FOUNDRY SERVICE

ENGINEERS

CANNON
NON CORROSIVE, INSTANT STARTING MATCH PLATE VIBRATORS

Inexpensive, light weight and powerful, these vibrators have stainless steel bodies and precision fit hard chrome plated steel pistons. Balanced intake and air exhaust avoids "pull" on the piston, minimizing wear and assuring long, trouble-free operation. Easily lubricated. Proven in foundries for years. 3/8" to 2" sizes. Also stud and double end mountings.

CANNON
"QUIET-TYPE" BIN AND HOPPER VIBRATORS
No Metallic Noise, No Springs, No Breakage



Long stroke, springless, air cushioned piston develops an extremely powerful, high frequency, non-destructive vibration, eliminating ear splitting pounding, and breakage of any part of the vibrator assembly. Investigate this newest development in pneumatic vibration. 1 5/8" to 4" sizes. Wide range of applications. Patents Pending.

CANNON VIBRATOR CO.
Division of Berkshire Manufacturing Company
1107 POWER AVE., CLEVELAND 14, OHIO

Write for Prices and Catalog Today!

Less Costly Production Through Better Pneumatic Vibration

HIGH PRODUCTION MELTING FURNACE

with plenty of "PLUS"

ECLIPSE "RB" Crucible Furnace

For heavy foundry production in melting brass, bronze, aluminum and other alloys, this Gas-Fired Eclipse Crucible Furnace meets every requirement—and in addition has many "plus" construction features that make it unusually practical and economical.

+1 **Sturdy Shell Construction:** The furnace shell is heavy sheet steel with welded seams reinforced with flat stock band to eliminate top distortion. Shell bottom is constructed of heavy plate raised off floor to provide proper ventilation under furnace.

+2 **Lining:** The highest quality of refractory materials is used in the furnace lining to give a lining of long endurance.

+3 **Cover Construction:** The roll back cover provides a tight-fitting seal between furnace and cover and helps keep floor space to a minimum. Heavy cover frame work and roller rails combine to make a durable cover arrangement.

+4 **Burner and Mixing Equipment:** The burner equipment supplied on this type of equipment consists of a McKee Special Walltite burner designed for high production melting. Proper air-gas ratio adjustment is maintained by using a McKee Low Pressure Proportional Mixer. Regulation of heat imput is easily controlled by the single valve control of mixer.

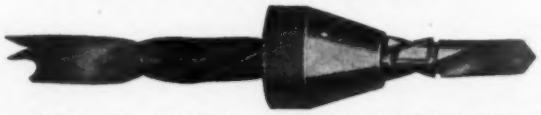
The Eclipse line of Gas-Fired, Non-Ferrous Metal Melting Furnaces includes a size and type to fit your foundry needs. Write for Bulletin C-2 describing various models of crucible furnaces, with full specifications.

Eclipse Fuel Engineering Company
725-11 S. MAIN ST. ROCKFORD, ILLINOIS
McKee Eclipse

NO SUBSTITUTE REQUIRED when USING SMILLIE

"Core Blowing Operations"

INSERTING DRILL



• Uniformity of holes • Faster insertion of vent • Correct Depth

CORE BOX VENTS

DEEP HEAD Wide or Narrow Slots .014 .010
SHALLOW HEAD Wide or Narrow Slots .014 .010
MESH .035

C. M. SMILLIE & CO.

1124 WOODWARD HGTS., FERNDALE 20, MICHIGAN
TOOLS • PRECISION MACHINED and GROUND PARTS • FIXTURES

MIX CORE SANDS MOLDING SANDS CUPOLA PATCH MIXES IN 4 MINUTES FLAT

THEN *DISCHARGE 'EM* IN THIRTY SECONDS

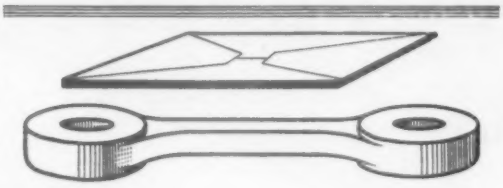
Lower Costs? YOU BET!

It's the new PERFECT MIX MULTIMIXER that kneads, as it turns, as it rubs to give you the most modern equipment of its kind on the market today for better cores—better castings. Sizes from 3 to 60 cu. ft. Hundreds of units in operation. Direct motor drive—no clutch—no belts. A real time saver—cost cutter.

Sold only through nationally known foundry and equipment dealers. Consult your supply dealer or write direct.

MULTIPLEX MACHINERY CORP. ELMORE OHIO

Gamma rays .....
unexposed film .....
steel casting .....



and there you have a method whereby you can increase your foundry production and improve your practice!

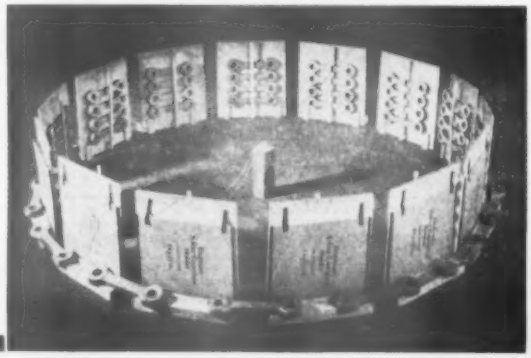
RADIUM RADIOGRAPHY

is new, compared with X-ray radiography, but its peculiar advantages have been finding increasing favor with steel foundries. The first commercial radiograph with radium was made in 1930—an exposure of the sternpost of the cruiser "Chester"—and by 1948 200 steel foundries throughout the country were using radium radiography. The equipment is absurdly simple, and, since it may be rented or leased, no capital expenditure is necessary. No special training is required to operate it, either. The constant activity of radium, the even dispersion of its rays with a minimum of scattering; the portability of the equipment and simplicity of operation all combine to make radium radiography a sound commercial proposition for manufacturers of steel castings. Write today for case histories and additional information.

RADIUM CHEMICAL CO., INC.

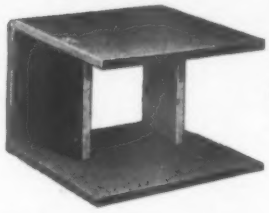
570 Lexington Ave., N. Y. 22, N. Y. Chicago: Marshall Field Annex Bldg.
3723 Wilshire Bldg., Los Angeles 5, Cal.

Illustration shows 60 steel castings being photographed simultaneously. The gamma rays, flying in all directions, go through all the castings at once, making 60 exposures of the 60 castings.



BUFFALO "Double Angle" CHAPLETS

★ Greater Strength
★ Burn in more easily
★ Less Chilling



The extra strength of this exclusive *Angle Design* (originated and patented by Combined Supply and Equipment Co.) permits the use of these Buffalo Chaplets in thinner gauges.

Direct advantages are the ability to burn in more easily and a greater resistance to chilling.

Thorough coating promotes immediate fusion with the molten metal.

Your requirements may be met with Buffalo "Angle Stem" (Single) or "Double Angle" Chaplets, in a range of four metal gauges. Complete information, samples and prices promptly furnished.

CATALOG NO. 15 MAILED ON REQUEST
Contains useful data on complete line of chaplets

Combined SUPPLY & EQUIPMENT CO., INC.
211 CHANDLER ST., BUFFALO 7, N. Y.

Quantity
PRODUCTION
of
GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866
THE WHELAND COMPANY
FOUNDRY DIVISION

MAIN OFFICE AND MANUFACTURING PLANTS
CHATTANOOGA 2, TENNESSEE

for the
CLEANING, COOLING, and DRYING
of
COMPRESSED AIR
We Believe

that
The MURPHY A.S.F. (Aftercooler, Separator, Filter), which we manufacture in seven sizes and for capacities of 50 to 2,000 CFFAPM, is the most efficient device to be had at any price. And we back our belief with a

Guarantee

of performance as promised.
Built to
A.S.M.E. specifications
Write for
descriptive literature

GUARANTEED COMPRESSED AIR PRODUCTS

AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
SPRAY GUNS • PISTOL SPRAYERS

JAS. A. MURPHY & CO.
FIFTH AND VINE STREETS, HAMILTON, OHIO
Moisture Elimination Up To 3000 Pounds Per Square Inch

Reduce Use of Chills in Gray Iron Casting

Now all you have to do to get hard chilled iron is add

TELLURIUM

Comes in 1, 2, 3 and 4-gram tablets; also in powder, slabs and sticks. For full information, write Dept. LM for 8-page article, "Use of TELLURIUM In Promoting Chills On Gray Iron Castings."

American Smelting and Refining Company
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Heft plus

. . . plus cutters set at an angle in Desmond Heavy Duty Dressers provide extra shearing action for fastest dressing of specially bonded wheels. Spindle is mounted in dust-protected ball bearings. Buy from your industrial distributor . . . The Desmond-Stephan Manufacturing Co., Urbana, Ohio, makes the only complete line of grinding wheel dressing tools.

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MICHIGAN CITY, INDIANA

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Rapid Model 3/8" to 3"

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MODELS
MAKE STOCK CORES 3/8" to 7" IN ROUND, SQUARE AND IRREGULAR SHAPES . . . .
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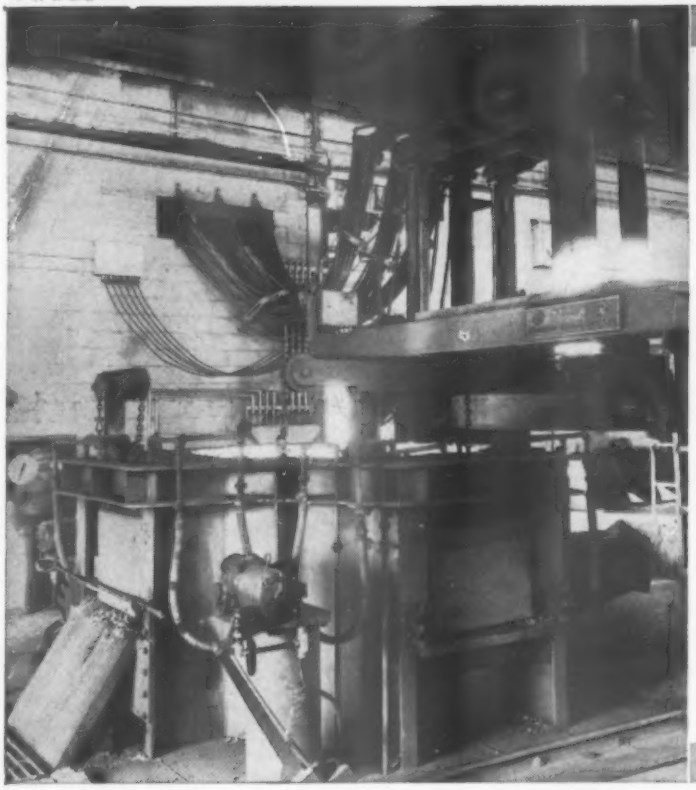
560 La Follette St.
Akron 11, Ohio



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. . . as ever, the dependable furnace for the production of high-grade stainless, alloy and rimming steels.

Precision-built, gear-driven mechanisms for maximum safety and dependability.

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USS **AMERICAN BRIDGE**
UNITED STATES STEEL

HEAVY DUTY PORTABLE No. 44

MIW

Designed to run over the sand pile. Width 65". Table Height 30". Table size 16" x 21". Pressure plate 8" x 15". Handles flasks up to 16" x 30". Set-off benches included. Durable aluminum enamel finish.

Moline Molding Machines are available in five models. Each is designed to deliver faster production, fewer rejects, a better profit. Write for catalog and prices.

MOLINE IRON WORKS
MOLINE, ILLINOIS, U. S. A.

ESTABLISHED 1878 • OVER SEVENTY YEARS OF SERVICE

OPEN HEAD *reduces casting rejects*

Patented

SAND PACKS SOUNDER UNDER THE HEAD AND AROUND STEM

Shoulder Radiator Chaplets

This exclusive chaplet design and time-proven quality and dependability are outstanding contributions to better castings and increased profit through minimized make-over losses.

We also make Motor, Forged Head, Fitted Head, Double Head Chaplets — and other types. *Write for Bulletin.*

Cleveland Chaplet & Mfg. Co.,
1197 West 67th Street
CLEVELAND, OHIO

CLEVELAND *Chaplets*
Since 1890

10 GRADES OF WASHED, DRIED, SCREENED

SILICA FOUNDRY SANDS

Produced from celebrated Ottawa District St. Peter Sandstone • Rounded Grains
Steel Molding Sand • Core Sand • Blast Sand • Furnace Bottom Sand
Opener Sand • Sand for Non-Ferrous, Aluminum, Magnesium Castings
MICROSIL Ground Silica (5 Standard Grades of Silica Flour)

MICROSIL GROUND SILICA

STANDARD SILICA CORPORATION

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DISTRIBUTORS IN ALL PRINCIPAL CITIES

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WILLIAMS *Buckets*

"HOOK-ON" SINGLE LINE
Special Type for
FOUNDRY SERVICE
3/8 to 2 cu. yd. cap.
Send for descriptive bulletin.
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are made of
DEPENDABLE COMPOSITION under LABORATORY CONTROL
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Statement of the ownership, management, and circulation required by the Act of Congress of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233) of THE FOUNDRY, published monthly at Cleveland, Ohio, for October 1, 1950. 1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The Penton Publishing Co., 1213 West Third St., Cleveland 13, O. Editor, Frank G. Steinebach, 1213 West Third St., Cleveland 13, O. Managing editor, William G. Gude, 1213 West Third St., Cleveland 13, O. Business manager, George A. Pope, 1213 West Third St., Cleveland 13, O. 2. The owner is The Penton Publishing Co., Cleveland, Ohio. Names and addresses of stockholders owning or holding 1 percent or more of total amount of stock: Edwin Barringer, Washington, D. C.; Samuel E. Bool, Cleveland, Ohio; Richard M. Bourne, Cleveland, Ohio; County National Bank of Santa Barbara, Santa Barbara, Calif.; J. R. Dawley, Cleveland, Ohio; Ernest C. Dempsey, Richard Inglis & Central National Bank of Cleveland as Trustees under agreement with John A. Penton dated Feb. 16, 1924, Cleveland, Ohio; The Fanner Manufacturing Co., Cleveland, Ohio; Agnes T. Hays, Cleveland, Ohio; George O. Hays, Cleveland, Ohio; Russell C. Jaenke, Cleveland, Ohio; S. H. Jasper, Pittsburgh, Pa.; A. L. Klingeman, Cleveland, Ohio; E. C. Kreutzberg, Washington, D. C.; J. D. Pease, Mount Dora, Fla.; L. E. Penton, Los Angeles, Calif.; E. L. Shaner, Cleveland, Ohio; Charles J. Stark, Cleveland, Ohio; Penelope M. Stark, Cleveland, Ohio; E. L. Werner, Cleveland, Ohio; Grace Whelan, Santa Barbara, Calif. 3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None. 4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner. Frank G. Steinebach. Sworn to and subscribed before me this 25th day of September, 1950. (Seal) R. W. Coleman. (My commission expires Dec. 26, 1950.)

FOUNDRY CORE PRACTICE

Second Edition
By Harry W. Dietert
Devoted completely and in great detail to the production of cores. Will prove beneficial to every foundryman.
548 pages illustrated $10.00 Postpaid
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CLEANING EQUIPMENT (Castings)

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.

CLUTCHES (Magnetic)

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.,
Stearns Magnetic Mfg. Co., 622 S. 28th St., Milwaukee 4, Wis.

COAL STORAGE BINS

Neff & Fry, Camden, O.

COBALT (Radio Active)

Eldorado Mining & Refining Ltd., P. O. Box 379, Ottawa, Ont.

COKE (Foundry)

DeBardeleben Coal Corp., 2201 First Ave., N., Birmingham 3, Ala.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Pickands, Mather & Co., Cleveland 14, O.
Republic Coal & Coke Co., 8 So. Michigan Ave., Chicago 3, Ill.
Semet Solvay Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.

COKE (Petroleum)

Republic Coal and Coke Co., 8 S. Michigan Ave., Chicago 3, Ill.

COLLECTORS (Dust)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland, O.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Pangborn Corp., Hagerstown, Md.
Schmieg Industries, 302 Piquette St., Detroit 2, Mich.
Schneible Co., Claude B., 2827 25th St., Detroit 16, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

CONCRETE STORAGE BINS

Neff & Fry Co., Camden, O.

CONTROL SYSTEMS (Dust)

American Air Filter Co., 223 Central Ave., Louisville, Ky.
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Schmieg Industries, 302 Piquette St., Detroit 2, Mich.
Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

CONVERTER BLOWERS

Roots-Connersville Blower Corp., Connersville, Ind.

CONVERTERS (Bessemer)

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CONVEYOR DESIGN

Giffels & Valet, Inc., Marquette Bldg., Detroit, Mich.

CONVEYORS (Apron)

Logan Co., 580 Cabel, Louisville, Ky.

CONVEYORS (Belt)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The 2424 No. Cicero, Chicago 39, Ill.
Boston Woven Hose & Rubber Co., 29 Hampshire, Cambridge 39, Mass.
Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Chain)

Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Gravity)

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Live Roller)

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Magnetic)

Stearns Magnetic Mfg. Co. 662 S. 28th St., Milwaukee 4, Wis.

CONVEYORS (Monorail)

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 E. 283rd St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works, Reading, Pa.

CONVEYORS (Overhead)

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

CONVEYORS (Pneumatic)

Fuller Company, Catasauqua, Pa.

CONVEYORS (Portable)

Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

CONVEYORS (Portable-Gas Electric)

Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

CONVEYORS (Rubber)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Vibrating)

Ajax Flexible Coupling Co., Westfield, N. Y.
Jeffrey Mfg. Co., 907 N. Fourth St., Clumbus 16, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.
Syntron Company, Homer City, Pa.

COPPER

Federal Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

COPPER SHOT

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Niagara Falls Smelting & Refining Div., Continental-United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.

CORE BINDERS

American Gum Products Co., 500 Fifth Ave., New York 18, N. Y.
Archer-Daniels-Midland Co., Werner G. Smith Div., 2191 W. 110th St., Cleveland 2, O.
Bakelite Corp., 300 Madison Ave., New York 17, N. Y.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Corn Products Sales Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE BINDERS (Cont'd.)

General Electric Co., Pittsfield, Mass.
Hercules Powder Co., Wilmington 99, Del.
E. F. Houghton Co. 303 W. Lehigh Ave., Philadelphia 33, Pa.
Chas. A. Krause Milling Co., 404 E. State St., Milwaukee 1, Wis.
Monsanto Chemical Co., Plastic Division, Springfield 2, Mass.
Robeson Process Co., 500 Fifth Ave., New York 18, N. Y.
Frederic B. Stevens, Inc., Detroit 16, Mich.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
Werner G. Smith, Inc. Union Commerce Bldg., Cleveland 14, Ohio.

CORE BLOWER BUSHINGS

Eastern Clay Products, Inc. Jackson, Ohio.
Martin Engineering Co., Kewanee, Ill.

CORE BLOWING MACHINES

Champion Foundry & Machine Co., 1553 W. Madison St., Chicago 7, Ill.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Suppy Co., 4600 E. 71st St., Cleveland 5, O.
Harrison Machine Co., Wesleyville, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Western Hardware & Specialty Mfg Co., 3830 No. Fratney, Milwaukee, Wis.

CORE BOXES

Accurate Match Plate Co., 1847 W. Caroll St., Chicago, Ill.
Industrial Pattern Works, 2625 West Belmont Ave., Chicago 18, Ill.

CORE COLORING

Eaton Chemical & Dyestuff Co. 1490 Franklin, Detroit, Mich

CORE COMPOUND

Archer-Daniels-Midland Co., Werner G. Smith Div., 2191 W. 110th St., Cleveland 2, O.
Bakelite Corp., 300 Madison Ave., New York 17, N. Y.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Werner G. Smith, Inc., Union Commerce Bldg., Cleveland 14, O.

CORE DRAWER

Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.

CORE DRAWING MACHINES

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Freeman Supply Co., Toledo 5, O.
Newaygo Engineering Co., Newaygo, Mich.

CORE DRIERS (Dielectric)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

CORE GRINDERS (Power Operated)

Jeffrey Mfg. Co., Columbus 16, O.
Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.
Standard Pattern Works, 6771 E. McNichols, Detroit 12, Mich.
Sutter Products Co., Dearborn, Mich.

CORE KNOCKOUT MACHINES

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Pangborn Corp., Hagerstown, Md.
Simplicity Engineering Co., Durand, Mich.

CORE MAKING MACHINES

Champion Foundry & Machine Co., 1553 W. Madison St., Chicago 7, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Suppy Co., 4600 E. 71st St., Cleveland 5, O.
Harrison Machine Co., Wesleyville, Pa.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Wadsworth Equipment Co., 560 Lafollette St., Akron, Ohio.

CORE OILS

Archer-Daniels-Midland Co., Werner G. Smith Div., 2191 W. 110th St., Cleveland 2, O.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Frederic B. Stevens, Inc., Detroit 26, Mich.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
Werner G. Smith, Inc., Union Commerce Bldg., Cleveland 14, Ohio.

CORE OVENS

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, O.
Despatch Oven Co., Minneapolis 14, Minn.
Drying Systems, Inc., 1801 Foster Ave., Chicago 40, Ill.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis 6, Mo.
Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N. Y.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

CORE PASTE

Corn Products Sales Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Eastern Clay Products Co., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc. 18th St. & Vernor Highway, Detroit 16, Mich.

CORE PLATES (Steel, Asbestos)

Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

CORE ROD STRAIGHTENING and CUTTING MACHINERY

American Wheelabrator & Equipment Co., Mishawaka, Ind.

CORE SAND

American Silica Sand Co., Central Life Bldg., Ottawa, Ill.
Ottawa Silica Co., Ottawa, Ill.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Weldron Silica Co., 38 So. Dearborn St., Chicago, Ill.

CORE SAND MIXERS

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Baker Perkins Inc., Saginaw, Mich.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Clearfield Machine Co., Clearfield, Pa.
Federal Foundry Supply Co., 4600 E.71st St., Cleveland 5, Ohio.
Multiplex Machinery Corp., Elmore, Ohio.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Posey Iron Works Inc., Lancaster, Pa.
Royer Foundry & Machine Co., Kingston, Pa.

CORE SPRAYERS

Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.

CORE STRIPPERS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE TRAYS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

CORE TRUCKS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

CORE VENTS

Demmler, Wm., & Bros., Kewanee, Ill.
Smillie, C. M. & Co., 1124 Woodward Heights Blvd., Ferndale 20, Mich.
United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

CORE WASH

Asbury Graphite Mills, Asbury, N. J
Bloomsbury Graphite Co., Bloomsbury, N. J.
Carborundum Co., Perth Amboy, N. J.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Corn Products Sales Co., 17 Battery Pl., New York City 4.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Stevens, Frederic B., Inc., Detroit 26, Mich.
Titanium Alloy Mfg. Co., Hyde Park Blvd., Niagara Falls, N. Y.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
United States Graphite Co., Saginaw, Mich.

CORE WIRE CUTTERS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE WIRE STRAIGHTENERS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE WIRES

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.

CORES (Annealing)

Pressed Steel Co., Wilkes-Barre, Pa.

COUPLINGS (Air Line)

Cleco Division of Reed Roller Bit Co., Houston, Tex.

COUPLINGS (Flexible)

Ajax Flexible Coupling Co., Westfield, N. Y.

CRANE LUBRICATING SYSTEMS

Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.

CRANES (Bucket)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Electric Tramrail)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.

CRANES (Electric Traveling)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Erie Steel Construction Co., Erie, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Gantry)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.
Wellman Engineering Co., 7000 Central Ave., Cleveland 4, O.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Hand Traveling)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, Ohio.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Jib)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Monorail)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.

CRANES (Self-Propelled)

Silent Hoist & Crane Co., 835 63rd St., Brooklyn 20, N. Y.

CRANES (Traction or Tractor)

Silent Hoist & Crane Co., 835 63rd St., Brooklyn 20, N. Y.

CRUCIBLES

American Crucible Co., North Haven, Conn.
Bay State Crucible Co., Taunton, Mass.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Lava Crucible Co., Pittsburgh, Pa.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Vesuvius Crucible Co., Swissvale, Pa.

CRUCIBLE FURNACES

Ajax Electrothermic Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

CRUCIBLE LIFTERS

Modern Equipment Co., Port Washington, Wis.

CRUCIBLE POURING DEVICES

Modern Equipment Co., Port Washington, Wis.

CRUSHERS (Core)

Simplicity Engineering Co., Durand, Mich.

CUPOLAS

Modern Equipment Co., Port Washington, Wis.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Lamson Co., Syracuse 1, N. Y.
Roots-Connersville Blower Corp., Connersville, Ind.
Spencer Turbine Co., Hartford, Conn.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CHARGING MACHINES

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CONTROL EQUIPMENT

Edwin S. Carman, 1643 Lee Road, Cleveland 18, Ohio.
Foxboro Company, Foxboro, Mass.

CUPOLA DUST ARRESTORS

Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.

CUPOLA HOT BLAST EQUIPMENT

J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N. Y.

CUPOLA LININGS

Carborundum Co., Perth Amboy, N. J.
Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.
A. P. Green Fire Brick Co., Mexico, Missouri.
Ironton Fire Brick Co., Ironton, O.
United States Graphite Co., Saginaw, Mich.

CUPOLA PATCHING GUNS

Eastern Clay Products, Inc., Jackson, Ohio.

CUPOLA SPARK ARRESTORS

Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUTOFF MACHINES (Abrasive)

Fox Grinders Inc., Oliver Bldg., Pittsburgh, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

CYLINDERS (Hydraulic)

Miller Motor Co., 4027 N. Kedzie, Chicago 18, Ill.

DARK ROOM ACCESSORIES (X-Ray)

Eastman Kodak Co., Rochester, N. Y.
General Electric X-Ray Corp., 4855 Electric Ave., Milwaukee 14, Wis.

DARK ROOM PROCESSING (Chemical Tanks, etc.)

Eastman Kodak Co., Rochester, N. Y.

DEGASIFIERS

Metalloy Corp., Rand Tower, Minneapolis 2, Minn.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Niagara Falls Smelting & Refining Div., Continental-United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.

DEOXIDIZERS

Ajax Metal Co., 46 Richmond St., Philadelphia 23, Pa.
Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Metalloy Corp., Rand Tower, Minneapolis 2, Minn.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Niagara Falls Smelting & Refining Div., Continental-United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

DEOXIDIZERS (Ferrous)

Carborundum Co., Perth Amboy, N. J.

DESULPHURIZERS

American Silica Sand Co., Central Life Bldg., Ottawa, Ill.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hercules Powder Co., Wilmington 99, Del.
Mathieson Chemical Corp., 60 Mathieson Bldg., Baltimore 3, Md.
Modern Equipment Co., Port Washington, Wis.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Solvay Sales Division Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DIE CASTING MACHINES

Kux Machine Co., 3930 W. Harrison St., Chicago 24, Ill.
Lester-Phoenix Inc., 2711 Church St., Cleveland 13, Ohio.
Miller-Taylor Tool Co., 5005 Euclid Ave., Cleveland 3, Ohio.

DIES

City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Lester-Phoenix Inc., 2711 Church St., Cleveland 13, Ohio.

DIRECT FIRED HEATERS

Dravo Corp., Neville Island, Pittsburgh 25, Pa.

DOWEL PINS

Standard Horse Nail Corp., New Brighton, Pa.

DRILLS (Pneumatic)

Gardner-Denver Co., Quincy, Ill.
Schramm Inc., West Chester, Pa.

DRIVES (Reciprocating)

Ajax Flexible Coupling Co., Westfield, N. Y.

DRUMS (Magnetic)

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

DRYERS

Porbeck Mfg. Co., 2600 N. 9th St., St. Louis 6, Mo.

DRYING OVENS

Drying Systems, Inc., 1801 Foster Ave., Chicago 40, Ill.

DUMP HOPPERS

Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

DUMP TRUCKS

Frank G. Hough Co., Libertyville, Ill.
Kwik-Mix Co., Port Washington, Wis.
Prime Mover Co., Muscatine, Iowa.

DUST ARRESTING EQUIPMENT

American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Dracco Corp., 4063 East 116th St., Cleveland 5, Ohio.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Pangborn Corp., Hagerstown, Md.
Schmeig Industries, 302 Piquette St., Detroit 2, Mich.

DUST ARRESTING EQUIPMENT (Cont'd.)

Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DUST COLLECTORS

Pangborn Corp., Hagerstown, Md.
Schmeig Industries, 302 Piquette, Detroit 2, Mich.
Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.

DUST COLLECTORS (Shake-out)

Pangborn Corp., Hagerstown, Md.

DUST CONTROL (Chemical)

Dracco Corp., 4063 East 116th St., Cleveland 5, Ohio.
Pangborn Corp., Hagerstown, Md.
Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.

DUST RECOVERY SYSTEMS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Dracco Corp., 4063 East 116th St., Cleveland 5, Ohio.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Pangborn Corp., Hagerstown, Md.

DYES & CHEMICALS

Eaton Chemical & Dyestuff Co., 1490 Franklin, Detroit, Mich.

ELECTRIC FURNACES (see Furnaces, Electric)

ELECTRODES (Graphite and Amorphous)

International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co., Inc., Electrode Sales Div., 30 E. 42nd St., New York 17, N. Y.

ELEVATORS

Standard Conveyor Co., North St. Paul 9, Minn.

ELEVATORS (Bucket)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

ELEVATORS (Material Handling)

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

ELEVATORS (Pneumatic, Material Handling)

Fuller Co., Catasauqua, Pa.

ENGINEERING SERVICE (Foundry)

H. K. Ferguson, 1783 E. 11th St., Cleveland 14, Ohio.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
A. H. Putnam Co., 1319 2nd Ave., Rock Island, Ill.

ENGINEERING SERVICE (Foundry) (Cont'd.)

Westover Engineers, 424 E. Wells St., Milwaukee 2, Wis.

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Frontier Bronze Corp., 818 Elmwood Ave., Niagara Falls, N. Y.
International Nickel Co., Inc., 67 Wall St., New York City 5.
R. Lavin & Sons Inc., 3426 So. Kedzie Ave., Chicago 23, Ill.
Northwestern Iron & Metal Co., 900 "T" Street, Lincoln, Nebraska.
Sonken-Galamba Corp., Kansas City 18, Kansas.
Western Metals Co., 3201 So. Kedzie Ave., Chicago 23, Ill.

INJECTION MOLDING MACHINES

Lester-Phoenix Inc., 2711 Church St., Cleveland 13, Ohio.

INOCULANTS

Carborundum Co., Perth Amboy, N. J.
United States Graphite Co., Saginaw, Mich.

IRON CEMENT

Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N. J.

IRON ORE

Pickands, Mather & Co., Cleveland 14, O.

IRON OXIDES

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

JACKETS (Mold)

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

LABORATORY EQUIPMENT (Chemical)

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

LABORATORY EQUIPMENT (Physical)

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
E. Leitz Inc., 730 Fifth Ave., New York 19, N. Y.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Norton Co., Worcester 6, Mass.

LADLES

Industrial Equipment Co., Minster, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Modern Equipment Co., Port Washington, Wis.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

LADLE LININGS

A. P. Green Fire Brick Co., Mexico, Missouri.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, Ohio.
United States Graphite Co., Saginaw, Mich.

LEAD

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

LINSEED OIL

Hercules Powder Co., Wilmington 99, Del.

LOADERS

Clearfield Machine Co., Clearfield, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

LOADERS (Tractor-Mounted)

Frank G. Hough Co., Libertyville, Ill.

LUBRICANTS (Industrial)

Acheson Colloids Corp., Port Huron, Mich.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
United States Graphite Co., Saginaw, Mich.

MACHINE KEYS

Standard Horse Nail Corp., New Brighton, Pa.

MAGNESIUM (Ingots)

Apex Smelting Co., 2537 West Taylor St., Chicago 12, Ill.
Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

MAGNET CONTROLLERS

Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.

MAGNETS

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

MANGANESE (Briquets)

Electro Metallurgical Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

MATCH PLATE METAL

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

MATCHPLATES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Central Pattern Co., Quincy, Ill.
Champion Foundry & Machine Co., 1553 W. Madison St., Chicago 7, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Pattern Works, 2625 West Belmont Ave., Chicago 18, Ill.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3, O.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.
Springfield Pattern Works Inc., 124 Switzer Ave., Springfield, Mass.
Arthur E. Will, 643 West 11th St., Erie, Pa.

MATERIALS HANDLING EQUIPT.

Frank G. Hough Co., Libertyville, Ill.

MATERIALS HANDLING (Hoists)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.

MECHANICAL ENGINEERS

Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.

MELTING POTS

Acme Foundry Co., Detroit 16, Mich.

METAL CASTING PLASTER

United States Gypsum Co., 300 W. Adams St., Chicago, Ill.

METAL CLEANING EQUIPMENT

American Wheelabrator & Equipment Co., Mishawaka, Ind.

Pangborn Corp., Hagerstown, Md.

METALLOGRAPHIC EQUIPMENT

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

General Electric X-Ray Corp., 4855 Electric Ave., Milwaukee 14, Wis.

METALLURGISTS

Crobaugh Co., Frank L., 1426 West Third St., Cleveland 13, Ohio.

METERS (Gas, Air, Water)

Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.

Roots-Connersville Blower Corp., Connersville, Ind.

MIXERS (Core Wash)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Multiplex Machinery Corp., Elmore, Ohio.

MIXERS (Sand and Clay)

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.

Clearfield Machine Co., Clearfield, Pa.

Construction Machinery Co., Waterloo, Iowa.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.

Multiplex Machinery Corp., Elmore, Ohio.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Posey Iron Works, Inc., Lancaster, Pa.

Royer Foundry & Machine Co., Kingston, Pa.

MOLD CONVEYORS

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.

Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.

Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

Logan Co., 580 Cabel, Louisville, Ky.

Mathews Conveyer Co., Ellwood City, Pa.

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

Newaygo Engineering Co., Newaygo, Mich.

MOLD COOLING HOODS

Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.

MOLD DRYERS

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

MOLD OVENS and DRYERS

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.

Despatch Oven Co., Minneapolis 14, Minn.

Drying Systems, Inc., 1801 Foster Ave., Chicago 40, Ill.

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.

Lanly Company, 750 Prospect Ave., Cleveland 15, O.

Ross Engineering Corp., J. O., 444 Madison Ave., New York 17, N. Y.

MOLD TRUCKS (Power Operated)

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.

MOLD WASH

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.

Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

United States Graphite Co., Saginaw, Mich.

MOLDING MACHINES

Adams Co., Dubuque, Iowa.

Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.

Berkshire Mfg. Co., 1111 Power Ave., Cleveland 14, Ohio.

British Moulding Machine Co., Faverham, Kent, England.

Champion Foundry & Machine Co., 1553 W. Madison St., Chicago 7, Ill.

Davenport Machine & Foundry Co., Davenport, Iowa.

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

International Molding Machine Co., LaGrange Park, Ill.

Johnston & Jennings Div., Pettibone-Mulliken Corp., 2424 No. Cicero Ave., Chicago 39, Ill.

Milwaukee Foundry Equipment Div. Spo Inc., 3238 W. Pierce St., Milwaukee 4, Wis.

Moline Iron Works, Moline, Ill.

Nichols, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

Pioneer Mfg. Co., West Allis, Wis.

S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

MOLDING MACHINES (Jolt)

Adams Co., Dubuque, Iowa.

Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.

Davenport Machine & Foundry Co., Davenport, Iowa.

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

International Molding Machine Co., LaGrange Park, Ill.

Johnston & Jennings Div., Pettibone-Mulliken Corp., 2424 No. Cicero Ave., Chicago 39, Ill.

Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.

Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

MOLDING MACHINES (Rollover)

Champion Foundry & Machine Co., 1553 W. Madison St., Chicago 7, Ill.

Davenport Machine & Foundry Co., Davenport, Iowa.

MOLDING MACHINES (Rollover) (Cont'd.)

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

International Molding Machine Co., LaGrange Park, Ill.

Johnston & Jennings Div., Pettibone-Mulliken Corp., 2424 No. Cicero Ave., Chicago 39, Ill.

Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.

Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

Sutter Products Co., Dearborn, Mich.

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

MOLDING MACHINES (Squeeze)

Adams Co., Dubuque, Iowa.

Champion Foundry & Machine Co., 1553 W. Madison St., Chicago 7, Ill.

Davenport Machine & Foundry Co., Davenport, Iowa.

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

International Molding Machine Co., LaGrange Park, Ill.

Johnston & Jennings Div., Pettibone-Mulliken Corp., 2424 No. Cicero Ave., Chicago 39, Ill.

Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.

Moline Iron Works, Moline, Ill.

Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

MOLDING SANDS

American Silica Sand Co., Central Life Bldg., Ottawa, Ill.

Ottawa Silica Co., Ottawa, Ill.

Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.

Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

MOLYBDENUM

Molybdenum Corporation of America, Pittsburgh 19, Pa.

MONOGRAMS & TRADE MARKS

H. P. Maughlin Co., 953 Ingleside Ave., Columbus, Ohio.

MONORAIL SYSTEMS

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.

Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

Modern Equipment Co., Port Washington, Wis.

MOTORS (Electric)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.

MULLERS (Portable)

Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.

NAILS (Chill)

Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland 5, O.

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.

Republic Steel Corp., 3100 E. 45th St., Cleveland 4, Ohio.

Standard Horse Nail Corp., New Brighton, Pa.

NICKEL

International Nickel Co., Inc., 67 Wall St., New York City 5.

NITROGEN

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

NOZZLES (Blasting)

Alloy Metal Abrasives Co., 311 W. Huron St., Ann Arbor, Mich.

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.

Davenport Machine & Foundry Co., Davenport, Iowa.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Norton Co., Worcester 6, Mass.

Pangborn Corp., Hagerstown, Md.

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

OIL BURNERS

Hauck Manufacturing Co., 106 Tenth St., Brooklyn 15, N. Y.

Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

OVENS (Annealing and Heat Treating)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.

Despatch Oven Co., Minneapolis 14, Minn.

Electric Furnace Co., Salem, Ohio.

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

Lanly Company, 750 Prospect Ave., Cleveland 15, O.

Lindberg Engineering Co., Fisher Furnaces Div., 2450 West Hubbard, Chicago 12, Ill.

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

OVENS (Core) (See CORE OVENS)

OVENS (Enameling, Japanning)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.

Despatch Oven Co., Minneapolis 14, Minn.

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.

OVENS (Mold)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.

Despatch Oven Co., Minneapolis 14, Minn.

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.

OXYGEN

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

PAINTS (Graphite)

Joseph Dixon Crucible Co., Monmouth St., Jersey City, N. J.

PARTING COMPOUNDS

Delta Oil Products Co., Milwaukee 9, Wis.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.

PARTING COMPOUNDS (Cont'd.)

Frederic B. Stevens, Inc., Detroit 16, Mich.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN COATINGS

American Lacquer Solvents Co., Phoenixville, Pa.

PATTERN COMPOUND

Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN LETTERS

Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.
H. P. Maughlin Co., 953 Ingleside Ave., Columbus, Ohio.

PATTERN LUMBER

Dougherty Lumber Co., Cleveland 5, O.
Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.
Rietz Lumber Co., 1800 N. Central Park Ave., Chicago, Ill.

PATTERN METAL

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Niagara Falls Smelting & Refining Div., Continental-United Industries Co. Inc., 2204 Elmwood Ave., Buffalo 17, New York.

PATTERN PLASTER

United States Gypsum Co., 300 W. Adams St., Chicago, Ill.

PATTERN PLATES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Buffalo Pattern Works, 830 Hertel Ave., Buffalo, N. Y.
Central Pattern Co., Quincy, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Pattern Works, 2625 West Belmont Ave., Chicago 18, Ill.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.
Arthur E. Will, 643 West 11th St., Erie, Pa.

PATTERN SHOP EQUIPMENT

Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.
Milwaukee Leather Belting Co., 1114 No. Water St., Milwaukee, Wis.
Oliver Machinery Company, Grand Rapids 2, Mich.

PATTERNS

Industrial Pattern Works, 2625 West Belmont Ave., Chicago 18, Ill.

PATTERNS (Plastic)

Central Pattern Co., Quincy, Ill.

PATTERNS (Wood, Metal)

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Buffalo Pattern Works, 830 Hertel Ave., Buffalo, N. Y.
Central Pattern Co., Quincy, Ill.
Champion Foundry & Machine Co., 1553 W. Madison St., Chicago 7, Ill.

PATTERNS (Wood, Metal) (Cont'd.)

City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Pattern Works, 2625 West Belmont Ave., Chicago 18, Ill.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Springfield Pattern Works Inc., 124 Switzer Ave., Springfield, Mass.
Wellman Bronze & Aluminum Co., 2525 E. 93rd St., Cleveland 4, O.
Arthur E. Will, 643 West 11th St., Erie, Pa.

PERMANENT MOLDS

Centrifugal Casting Machine Co., Tulsa, Okla.
Reserve Machine & Tool Co., 10026 Detroit Ave., Cleveland, Ohio.

PHOSPHOR COPPER

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Niagara Falls Smelting & Refining Div. Continental-United Industries Co. Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.

PHOTOGRAPHIC EQUIPMENT

Eastman Kodak Co., Rochester, N. Y.
General Electric X-Ray Corp., 4855 Electric Ave., Milwaukee 14, Wis.

PHOTOGRAPHY (Industrial)

Eastman Kodak Co., Rochester, N. Y.

PIG IRON

Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Jackson Iron & Steel Co., Jackson, Ohio.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Pickands, Mather & Co., Cleveland 14, O.
Republic Steel Corp., 3100 E. 45th St., Cleveland 4, Ohio.
Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.
Woodward Iron Co., Woodward, Ala.

PIG IRON (Silvery)

Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

PINS (Flask)

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.
Universal Engineering Co., Frankenmuth, Mich.

PISTON RINGS (for Molding Machines, Compressors, etc.)

Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.

PLANT ENGINEERING SERVICE

H. K. Ferguson, 1783 E. 11th St., Cleveland 14, Ohio.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.

PLASTER of PARIS

United States Gypsum Co., 300 W. Adams St., Chicago, Ill.

PLATES (Bottom)

Adams Co., Dubuque, Iowa.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

PLATES (Core Drying)

Champion Foundry & Machine Co., 1553 W. Madison St., Chicago 7, Ill.
Johns-Manville, 22 East 40th St., New York 16.

PLATING TEMPERATURE CONTROLS

Foxboro Company, Foxboro, Mass.

PLUMBAGO

Bloomsbury Graphite Co., Bloomsbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
United States Graphite Co., Saginaw, Mich.

PNEUMATIC TOOLS

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Dayton Pneumatic Tool Co., Dayton 1, Ohio.
Gardner-Denver Co., Quincy, Ill.
Independent Pneumatic Tool Co., Aurora, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio.
Schramm Inc., West Chester, Pa.

POURING DEVICES

Industrial Equipment Co., Minster, Ohio.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

PRESSER BOARDS

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

PRESSURE CASTING SEALER

Empire Varnish Co., 2636 E. 76th St., Cleveland 4, O.
Tincher Products Co., Sycamore 12, Ill.

PRESSURE RECORDERS

Foxboro Company, Foxboro, Mass.

PROTECTIVE MATERIALS (X-Ray)

General Electric X-Ray Corp., 4855 Electric Ave., Milwaukee 14, Wis.

PULLEYS (Magnetic)

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

PUMPS

Construction Machinery Co., Waterloo, Iowa.
Gardner-Denver Co., Quincy, Ill.
Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.

PUMPS (Dry, Vacuum)

Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Fuller Company, Catasauqua, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.

PURIFIERS

Cleveland Flux Co., 1026 Main St., Cleveland 13, O.

PUSH-OFF MACHINES

Beardsley & Piper Co., 2424 N. Cicero, Chicago 39, Ill.
Champion Foundry & Machine Co., 1553 W. Madison St., Chicago 7, Ill.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Div. Spo Inc., 3238 W. Pierce St., Milwaukee 4, Wis.

PUTTY (Foundry)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

PYROMETERS

Foxboro Company, Foxboro, Mass.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Claude S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.
Pyrometer Instrument Co., Bergenfield, N. J.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

PYROMETERS (Immersion)

Pyrometer Instrument Co., Bergenfield, N. J.

PYROMETERS (Optical)

Pyrometer Instrument Co., Bergenfield, N. J.

RACKS (Core Ovens)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

RADIOGRAPHY (Industrial)

Eastman Kodak Co., Rochester, N. Y.
Eldorado Mining & Refining Ltd., P.O. Box 379, Ottawa, Ont.
Radium Chemical Co., Inc., 570 Lexington Ave., New York 22, N. Y.

RADIUM

Eldorado Mining & Refining Ltd., P.O. Box 379, Ottawa, Ont.
Radium Chemical Co., Inc., 570 Lexington Ave., New York 22, N. Y.

REFRACTORIES

Babcock & Wilcox Co., 85 Liberty St., New York 6, N. Y.
Carborundum Co., Niagara Falls, N. Y.
Carborundum Co., Perth Amboy, N. J.
Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.
Joseph Dixon Crucible Co., Monmouth St., Jersey City, N. J.
Eastern Clay Products, Inc., Jackson, O.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.

REFRACTORIES (Cont'd.)

A. P. Green Fire Brick Co., Mexico, Missouri.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Mexico Refractories Co., Mexico, Mo.
Norton Co., Worcester 6, Mass.
Richard C. Remmey Son Co., Hedley St. & Delaware River, Philadelphia 37, Pa.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Chas. Taylor Sons Co., P.O. Box 58, Annex Sta., Cincinnati 14, Ohio.
United States Graphite Co., Saginaw, Mich.

REPAIR PARTS (Molding Machine)

Pioneer Mfg. Co., West Allis, Wis.

RESPIRATORS

Wilson Products Inc., Reading, Pa.

RIDDLES

Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

RIDDLES (Electric)

Champion Foundry & Machine Co., 1553 W. Madison St., Chicago 7, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Great Western Mfg. Co., Leavenworth, Kans.

RIDDLES (Hand)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

ROD DIP

Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.

ROD STRAIGHTENERS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

RODS (Steel)

Republic Steel Corp., 3100 E. 45th St., Cleveland 4, Ohio.

ROLLER-HEARTH FURNACES (Electric Annealing)

General Electric Co., Schenectady, N. Y.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.

RUBBER LINING MATERIAL (Abrasive Resisting)

Pangborn Corp., Hagerstown, Md.

SAFETY CLOTHING

American Optical Co., Southbridge, Mass.
B. F. McDonald Co., 5112 South Hoover St., Los Angeles 37, Calif.
Pangborn Corp., Hagerstown, Md.

SAND ARRESTER TUBES

Martin Engineering Co., Kewanee, Ill.

SAND (Core, Molding, Blasting)

American Silica Sand Co., Central Life Bldg., Ottawa, Ill.
Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.
Ottawa Silica Co., Ottawa, Ill.
Pangborn Corp., Hagerstown, Md.
Producers Core Sand Corp., Michigan City, Ind.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

SAND BLAST BARRELS

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Help Wanted

SUPERVISOR

For large Michigan grey iron foundry. Must be experienced in producing heavy automotive castings. Give complete history and salary expected. All replies confidential.

BOX 182

THE FOUNDRY CLEVELAND 13, OHIO

WANTED

Practical man experienced in all phases of green sand nonferrous job-shop practice. Must have supervisory experience. In reply state age, experience and salary expected. Foundry located in Middle West.

BOX 238

THE FOUNDRY CLEVELAND 13, OHIO

FOUNDRY MANAGER

Southwestern Michigan manufacturer wants competent, experienced foundry manager for highly mechanized grey iron production foundry. Address: Box 219, The FOUNDRY, Cleveland 13, Ohio.

CORE ROOM FOREMAN

An outstanding Midwest Foundry requires a young man 30-35 years of age for Core Room Supervisor. Some coremaking experience necessary however, initiative, imagination and ability to get along with fellow workers are all very necessary. State age, experience and enclose a recent non returnable photograph. Replies confidential. Address: Box 228, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERVISOR

For a gray iron foundry in Western Pennsylvania melting 10 to 15 tons per day. Thorough experience in cupola operation, moulding and core room practice, sand control and chilled castings. We operate our own pattern shop. Please give personal experience, history, availability and salary expected. Address Box 233, The FOUNDRY, Cleveland 13, Ohio.

ALUMINUM FOUNDRY DEVELOPMENT ENGINEER

To take charge of small research and development aluminum foundry, familiar with aluminum casting. Must have technical as well as practical background in foundry work, including casting layout, sand cores, permanent mold, melting and pouring, some metallurgical technical training. Ideal living conditions on Long Island. Write stating qualifications, including age, experience and salary expected. Address: Box 222, The FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Well established, successful malleable iron foundry in Milwaukee area has an opportunity for metallurgist. Degree preferred, not required. Prefer man with experience in malleable duplex melting, chemical control and annealing and sand control. Age—30-40. Submit abstract, giving personal data, training and experience. Address: Box 215, The FOUNDRY, Cleveland 13, Ohio.

GENERAL MOLDING FOREMAN

Real opportunity in a modern Midwest Foundry, with a nationally known, well established firm. Squeezer, pin lift, slinger and floor molding experience required. Do not apply unless you have initiative, managerial ability and technical training. Should not be over 40 years of age. This position has definite possibilities for advancement in a short time to Foundry Superintendent. In reply state age, experience, salary expected and enclose a recent non returnable photograph. All replies strictly confidential. Address: Box 229, The FOUNDRY, Cleveland 13, Ohio.

Help Wanted

JOLT STRIP FOREMAN

Foreman to set up and supervise fully mechanized rollover and jolt squeeze strip production line. Must be experienced on this type unit producing high production. This is a new production line in the East. State age and experience. Address: Box 119, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Experienced and competent man to run coreroom on production cores, light grey iron. Foundry located in Midwest. Must be capable of handling 20 to 25 core makers and assemblers on Blower, Bench and Rollover work; also dry sand cylinder cores, etc. State age, experience, salary expected. Do not apply unless well qualified. Fine opportunity for right man. Address: Box 225, The FOUNDRY, Cleveland 13, Ohio.

MATCH PLATE FOREMAN

Must be well versed in the plaster process of making pressure cast match plates and core boxes. State age, experience, references and salary expected. Opportunity with established firm located in the middlewest. Address: Box 216, The FOUNDRY, Cleveland 13, Ohio.

Accounts Wanted

INDUSTRIAL MIDWEST SALES ORGANIZATION

Seeks additional line. Specializing in electrical and mechanical production items. Contacting engineering, production and purchasing departments of industrial manufacturers in Ohio, Indiana and Western Pennsylvania. Experienced and successful in promoting new items.

BOX 242

THE FOUNDRY CLEVELAND 13, OHIO

Positions Wanted

FOUNDRY SUPERINTENDENT OR ASSISTANT SUPERINTENDENT

Practical nonferrous and ferrous foundryman, 10 years research and development work in foundry practices. Well versed in gating and rigging. Thorough knowledge of sand control, x-ray, blueprint reading, estimating. Can handle men well. Author of several technical papers. Now employed in Eastern nonferrous foundry as superintendent. Desires Chicago area location. Address: Box 240, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

25 years' experience in grey foundry supervision. Fully familiar with foundry and cupola practice. Also can estimate from blueprints. Immediately available. Address: Box 198, The FOUNDRY, Cleveland 13, Ohio.

EXECUTIVE FOUNDRYMAN

Twenty-one years' experience in administration, sales, finance and operations in plants to 200 ton per day; manufacturing automotive, refrigeration, farm equipment and machine tool castings on a jobbing and high production basis. Have put three plants on a profitable basis. Graduate industrial engineer. Very cost conscious and progressive. Age 39, excellent references. Address: Box 231, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRY WORKS MANAGER OR SUPERINTENDENT

Age 49—32 years' practical experience in jobbing and mechanized production, thorough knowledge cupola practice, metallurgy, sand, molding and cores. 23 years in supervision. Capable, efficient and good references. Address: Box 193, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY SUPERINTENDENT

Thirty years' practical experience—grey iron or semi steel high tensil. Well versed in modern foundry practice, mechanized or conventional hand molding including synthetic or natural sand practices on any type or size castings dry or green. From drawing to finished rough castings. Capable of rigging from any type production or solving cost and method problems and complete management including sales. Available soon. Address: Box 196, The FOUNDRY, Cleveland 13, Ohio.

SALES ENGINEER

Age 37, metallurgical education, broad experience gray iron foundry operations, presently employed. Desires position as sales engineer with progressive gray iron foundry or foundry supply house. Address: Box 217, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Desires position as superintendent in grey iron jobbing shop. Ten years' practical and technical experience, 12 years as superintendent. Well versed in every phase of the foundry. Address: Box 226, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Thoroughly capable and of proven ability to reduce costs, reduce scrap percentage and to better quality of castings. Good success in handling labor relations. Grey iron and semi-steel. Now employed. Address: Box 218, The FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER

Mature, profit-minded, dependable. Has successfully managed four companies—two taken out of the red. Available for service shortly with medium-size company requiring reliable directing ability in management, sales finance and production. Excellent experience, foundry, machine and related lines. Address: Box 235, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN OR SUPERINTENDENT

Twenty-one years in foundry from apprentice to foreman to superintendent. Exclusively well versed experience for high production and scheduling of light and medium weight casting on air squeezer molding machines, core room, sand control, gating and rigging of pattern. Scrap conscious. Practical experience on cupola and nonferrous. Address: Box 158, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Specialized in cupola operation, gating and rigging, sand and quality control. Also brass melting and foundry mechanization. Former foundry consultant for large plants. Good record of production increase. Scrap decreased in a number of foundries. College graduate. Excellent references. Address: Box 236, The FOUNDRY, Cleveland 13, Ohio.

ATTENTION MANAGEMENT

Nearly 20 years of general foundry practice in both iron and steel. Also well versed in modern practices. Have served from foreman to general superintendent and manager. Qualified for any foundry assignment. Employed. Address: Box 230, Cleveland 13, Ohio.

FOUNDRY ACCOUNTANT & CHIEF CLERK

Fifteen years' experience foundry office procedure. Timekeeping, personnel, purchasing, pricing, billing, order acceptance, customer correspondence and accounting. Address: Box 227, The FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY

Supervisory capacity with 22 years' experience in all phases of steel foundry practice. Castings ranging from one pound to three tons. Methods of high speed production. Heading, gating, etc. Can give best references. Address: Box 234, The FOUNDRY, Cleveland 13, Ohio.

TIME STUDY ENGINEER

Thoroughly qualified, 14 years' foundry experience. Best of references. Address: Box 190, The FOUNDRY, Cleveland 13, Ohio

Classified Advertising

Opportunities

OPPORTUNITIES

Equipment to manufacture Bench-Vises For Sale

Opportunity for foundry to buy our Patterns, Drawings, Jigs, Fixtures, Aluminum Pressure Production Plates, Cuts and Forms for Catalogue Sheets, etc. and inventory of Screw-Machine Parts to manufacture four kinds of Bench-Vises and one Model Pedestal Grinder. Need room for expansion. Will instruct buyer the process to manufacture same. All incoming orders will be forwarded to buyer. Will sell at cost.

BOX 241

The FOUNDRY CLEVELAND 13, OHIO

OPPORTUNITY

Leading British Designers and Manufacturers of Foundry Plant (including many patented items) are desirous of contacting American and Canadian Engineers with a view to selling British designed foundry plant in America and Canada. Would be prepared to discuss eventual manufacture of such plant in either America or Canada or both.

BOX 237

THE FOUNDRY CLEVELAND 13, OHIO

MECHANICAL ENGINEER

With machine shop and foundry experience has $20,000 to invest, with personal service, in small going shop. Address: Box 220, The FOUNDRY, Cleveland 13, Ohio.

Available Capacity

AVAILABLE CAPACITY

Our foundry has open capacity to supply small and medium size gray iron castings. Send sample. Address: OREGON CASTINGS CO., RD 3, Lititz, Pa.

Foundries For Sale

FOR SALE OR LEASE

FLORIDA FOUNDRY

GREY IRON — ALUMINUM — BRASS

Owner wants to retire and enjoy the sunshine
Long established business
Modern building on railroad
Fastest growing section of state
Good proposition for younger man who wants to locate in warmer climate
Very reasonable terms to right party

S. J. SHREVES
2509 ELEVENTH STREET, NORTH
ST. PETERSBURG, FLORIDA

GENERAL JOBBING BRASS AND ALUMINUM FOUNDRY

In Buffalo, N. Y. Doing business since 1925. Price of $23,000 includes building, land, equipment and business good will. Owner wishes to retire. Address: Box 224, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Gray iron foundry in City of 100,000 population. Cupola with automatic charger, not operating at present. Wonderful opportunity for someone with know-how. $75,000 iron business leaving city each year. Price—$6,500.

WACO FOUNDRY INC.

P.O. BOX 583 WACO, TEXAS

Foundries For Sale

FOR SALE

Foundry building well located in San Jose, California. 10,000 sq ft. floor space, some equipment including electric furnace available, price $25,000 or with additional land $35,000.

SAN FRANCISCO & FRESNO LAND CO.
400 CALIFORNIA STREET
SAN FRANCISCO, CALIF.

FOR SALE

General jobbing gray iron foundry with large block building. Will sell reasonable. Address: FOLDS BROS. FOUNDRY CO., COLUMBUS, GEORGIA.

FOR SALE

Boiler and structural iron works due to death of owner. 100 miles North of Milwaukee, Wis. Good buildings on sidings. Address: Box 221, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Gray iron foundry. Center oil equipment industry Oklahoma. 4400 sq. ft., 32" cupola, wheelabrator tumblast, rollover, squeezer machines. Partnership dissolution. Address: BROKEN ARROW CASTING CO., BROKEN ARROW, OKLA.

FOR SALE OR LEASE

Modern equipped brass and aluminum foundry in continuous operation for 23 years. Have good selling, finished product. Old age and poor health reason for selling. Address: C. J. Doerr Brass Foundry, 725 N. Delphos St., Kokomo, Ind.

FOR SALE

Well established gray iron foundry located on Niagara Frontier. Room for expansion. Owner retiring from business.

BRUCE SWEET & ASSOCIATES

GENESEE BUILDING BUFFALO, NEW YORK

Wanted-To-Buy

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

WANTED

One #2 Simpson muller screening unit and magnetic separator. State condition and price in first reply. Address: Box 978, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Electric Furnace—1000 lb. capacity. Good to new condition. Address: EMPIRE PATTERN AND FOUNDRY CO., BOX 1647, TULSA, OKLAHOMA.

WANTED

Mechanized Pallet Type Molding Conveyor. Car size approximately 6½ ft. x 3½ ft. Address: Box 232, The FOUNDRY, Cleveland 13, Ohio.

WANTED

#300 iron flasks-prefer 17 x 70 x 11. Can use 17 x 68 x 10 or 18 x 70 x 12. Also need patterns, tumblers, core arbors and other equipment for soil pipe and fittings foundry. Address: Box 223, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Small used screenerator or Royer. Also a used aluminum gas firing holding furnace, 200 lbs. capacity. Give full particulars. Address: ADVANCE ALUMINUM & BRASS FOUNDRY, 1622 ONTARIO AVE., SHEBOYGAN, WISCONSIN.

Wanted-To-Buy

WANTED

1—Sklenar or Stroman, 1000 pound capacity, gas fired melting furnace for grey iron.

GENERAL WESCO STOVE COMPANY
BOX 271
SPRINGFIELD, MISSOURI

WANTED

1—Ajax-Northrup high frequency furnace, 20 to 40 KW.

THE INVESTMENT CASTING COMPANY
319 CHESTNUT STREET NEWARK 5, N. J.
TEL.: MARKET 3-2450

For Sale

FOR SALE

TURBO BLOWERS (3 Phase, 60 Cycle)

cfm	Pressure	Make	Motor H.P.	Volts	Speed
15,000	20 oz.	Ing.Rand	150	440	3570
8700	20 oz.	Ing.Rand	75	220	3500
3500	40 oz.	Spencer	60	440	1800
2200	40 oz.	Spencer	40	220/440	3600
1400	16 oz.	Spencer	220/440	3/60	3600
1000	32 oz.	Spencer	15	220	
900	24 oz.	Spencer	10	220/440	
225	10 oz.	Spencer	1	220/440	3600

PRESSURE BLOWERS (3 Phase, 60 Cycle)

2500	7 oz.	Sturtevant	15	220/440	1800
2400	14 oz.	Mahr	15	220/440	3480
1800	1 in.	Sturtevant	2	220/440	
1150	20 oz.	Nth.Amer.	10	220/440	3600
950	16 oz.	Nth.Amer.			
800	8 oz.	Sturtevant	7½	220/440	3600
800	24 oz.	American	10	220	3600
450	6 lbs.	A&B	30	220/440	3450
1800	1 in.	Sturtevant	2	220/440	
150	12 oz.	Nth.Amer.	1	220	3600

MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND, OHIO

FOR SALE

MOLDING MACHINES
2—SPO #305 joltstrippers
1—International 24 x 12" type GR Hand Ram, air turnover, foot draw
1—International 24 x 8" type RJ jolt ram hand turnover hand draw
1—74W Osborn Plain Squeeze Portable
2—75W Osborn Plain Squeeze Portable
3—75J Osborn Jolt Squeeze Portable
3—Federal RAPID Jolt Squeeze Portable
2—SPO #611B Stationary Oscillating Jolt Squeeze Strippers
1—SPO #4½ JHS Air Jolt Hand Strip
BLOWERS FOR CUPOLAS AND FURNACES
1—40 H.P. Spencer-Turbine 5100 CFM 18-oz. pressure
Maxon-Premix Blowers for Gas, ¼ to 1 H.P.
METAL MELTING EQUIPMENT
1—New Modern Model E Pouring Ladle 300 lb. cap.
1—Stationary crucible aluminum furnace, gas fired, 400# cap. complete with blower and motor
1—Hausfeld 2000# Aluminum Capacity Furnace, Barrel Type, open flame, oil fired
New 32" to 41" Dia. shell Cupolas made to order
TUMBLING MILLS AND SAND BLAST
5—28 x 60" round exhaust mills
1—Pangborn No. 2 GH direct pressure type sandblast barrel, motor driven. Complete Unit
1—Pangborn Sand Blast Unit, including generating tank, shot cleaner, bucket elevator. Suitable for use with room
MISCELLANEOUS
1—Standard Core Sand Mixer with 3 HP motor
2—Sly Economy #12 cloth screen dust collectors Complete stock of rebuilt mill & dust exhaust blowers.
1—Lamson Endless Mold Conveyor, 100 ft. long x 16 ft. wide, with 19 x 26" pallets, 36" on centers
4—Heavy Duty Flexible Shaft Grinders 2 H.P.

CLIFTON MACHINERY CO.
1023 W. SIXTH ST. CINCINNATI 3, OHIO

Classified Advertising

For Sale

AVAILABLE FOR IMMEDIATE DELIVERY

Quan.	Description	Model	Serial#	Mfg.	New
1	Clearfield Mixer—440 V. 60C-3Ph. Above equipped with No. 1 Clearfield Bucket Loader	404	3222-1	Clearfield Mach. Co.	1946
1	Demmler Core Blower	#1		Demmler Blower & Bros.	1942
1	Porbeck Air Recirculating	Type 2B	(Fuel Oil)	Porbeck Mfg. Co.	1945
1	Snagging Grinder 440 V. 60 Cy. 3 Ph. 10 H.P.—Spindle Speed 1000-1260 R.P.M.	#30E Model 100	34098	Standard Electrical Tool Co.	1947
4	Osborne Jolt-Squeeze Mold Machines (All Squeeze Machines Portable)	#275JW Sand Straddle		Osborne Co.	1945 (used 3 mo.)
1	Royer Sand Separator & Blender	1-Model NC2 All New Parts for Reconditioning			1944
1	Beardsley Piper Screenaerator		597398 48 x 48 Screen		1943
1	10 Ton Ladle	52" x 52" x 48"			1943
1	Johnson & Jennings Rollover, Bumper Pattern Draw		0610-2620 1505-3066 50" x 60"		1946
1	Johnson & Jennings		1958-3061 1505-3066 31" x 47"		1946
1	Johnson & Jennings 5" Flask Rapper		1020 Platten 48" x 31"	Johnson & Jennings Co. Cleve., Ohio	1946
8	Sand Boxes	40" x 40" x 28" deep 11" Leg			
1	Portable Sand Conditioner Beardsley Piper		SC73 Dings Magnetic Separator		1947 (never used)
1	Sandblast Room & Generator Rotary Table Type		American		
1	Toledo Platform Scale 1-6000#		72" x 48" Platform		

Sterling Flasks Size	Quantity
36 x 72 x 12	32
30 x 48 x 16	33
30 x 48 x 14	16
27 x 40 x 10	44
27 x 40 x 8	42

ALL ITEMS OFFERED SUBJECT TO PRIOR SALE

SPECIALTIES SERVICE & ENGINEERING CO., INC.

95 RIVER STREET **HOBOKEN, N. J.**

FOR SALE

2—Tabor, Air Jolt, Rollover Machines 14 x 16 Table.
1—Johnston & Jennings 24 x 30 Rollover.
1—Tabor 30 x 40 Rollover Machine.
1—#9 Whiting Cupola complete with Motor, Blower, and Blast Regulator.
10—"G" Power Rollover Machines.
15—Jolt Squeezers of most any make.
1—Automatic lift truck with charger.
1—Grinding Wheel Stand 3 x 24" Wheels.
1—Stearns Magnetic Pulley, New. Serial #20442, 125 volts, RPM 40. Manufactured by Stearns Magnetic Mfg. Co., Milwaukee, Wisconsin.
1—Motor Generator Model #498 Induction motor generator set ¾ KW diverter pole generator, 125 volts @ 6 amp DC with 1½ HP 220/440/60/30 Across the line motor. New.
1—30 x 48 Tumbling Mill with motor, V-belt drive.
1—36 x 60 Tumbling Mill with Motor, V-belt drive.
1—SPO Jolt Squeeze Pin Lift Machine No. 614-P, Serial #122. Pattern No. 2138410.
Belting, New, 187 Ft. Ajax 20" 5 Ply 28 oz. conveyor belting with ⅛" top and 1/32" bottom cover.
J.D.P. International Jolt Strippers.
3—J-275 Osborn jolt squeezers
15—J-76 Osborn jolt squeezers
1—Tabor Jolt Stripper 16" wide & 8" lift
4—Tabor Jolt Squeezers, practically new.

HAYNES FOUNDRY EQUIPMENT CO.
814 ADA ST. KALAMAZOO 52, MICH.

FOR SALE

275 JW Osborn Jolt Squeezers.....EA. $175.00
#1 U. S. Jolt Strip Molding Machines 12" cylinder—table size 18 x 22..... 375.00
#3 U. S. Jolt Strip Pattern Draw 16" Draw—table size 36 x 48..... 950.00

BALCHER MACHINERY COMPANY
1884 S. COMPTON ROAD
CLEVELAND HEIGHTS 18, OHIO
TELEPHONE: FAIRMOUNT 1-1186

SURPLUS STOCK OF
CRUCIBLE FURNACE COVERS

DOME TYPE COVERS—SILICON CARBIDE
(Standard Ring and Groove)
24" O.D. 8" center opening x 3½" thick .....$12.00 each
28" O.D. 8" center opening x 3½" thick .....$17.00 each
30" O.D. 8" center opening x 3½" thick .....$19.00 each
FLAT TYPE COVERS—FIRST QUALITY FIREBRICK
(Standard Ring and Groove)
24" O.D. 8" center opening x 3½" thick .....$5.50 each
26" O.D. 8" center opening x 3½" thick .....$6.50 each
28" O.D. 8" center opening x 3½" thick .....$7.50 each
All prices are F.O.B. Franklin Park, Ill.
LIMITED QUANTITIES AT THESE PRICES—FIRST COME, FIRST SERVE.

STROMAN FURNACE & ENGINEERING COMPANY
FRANKLIN PARK, ILLINOIS

FOR SALE

HYDRO-BLAST

Cleans castings, sand and air. In excellent condition.

CLEVELAND IRON & METAL CO.
2432 WEST 3rd ST. CLEVELAND, OHIO
FR 1-5555

FOR SALE

1—#4 Whiting Cupola W/new 2700 C.F.M. "North American Turbo-type Blower, 220-440V, 3 ph. 60 cy.
1—Whiting Elevator 1 ton cap. 20' lift (air operated)
1—Sly Sandblast room Type "F", size 8' x 8' x 10' with exhaust fan, bucket, hoist & dust collector.
1—Wardwell Saw filing machine & Saw set. Like new.
1—Lanly Recirculating type oven. Completely automatic, oil fired. Max. temperature 500°. Size 9'4" x 6'6" x 8'6" high.
6—Campbell-Hausfeld #200 Stationary Magnesium Melting furnaces.
1—Sklenar Reverbatory type furnace, oil fired. 1 ton capacity w/air ram, blower, 220 V, s ph. 60 cy.
4—Pit-type furnaces. Fisher burners. Oil fired, #250 crucible size.
1—Air Compressor, Gardner-Denver horizontal. Size 10 x 10. W/motor G.E. 40 hp., 200 V., 3 ph. 60 cy.
1—Wheelabrator Tumblast, operated less than 300 hours. Spare parts, Size 27" x 36".
Molding Machines:
2—Tabor Jar ram, hand rollover, hand draw.
3—Johnson-Jennings, Wall type.
1—Arcade Squeeze, 6" cylinder.
2—Osborn Floor bumpers, 1—18" cylinder, table 42" x 60"
1—16" cylinder, table 30" x 36"
2—Universal Sandthrowers—220 V., 3 ph., 60 cy.
Dietert Sand testing equipment: laboratory normalizer, Permameter, Compression machine, Rammer, Moisture teller, scales & weights, A.F.A. Screens.
1—Ames hardness tester.
1—Lincoln Electric welder, 600 amp. 220 V, 3 ph., 60 cy.
3—Gyratory riddles "Speed Sifters" 1/3 h.p. 220 V, 3 ph. 60 cy.
Miscellaneous equipment includes quantity wood snap & metal slip flasks, jackets, bottom boards, wood flasks & bottom boards. Oil stoves, core ovens, ladles, wire cutter & bender. Stand grinders, vises, table saws, blowers, air grinders, chipping hammers, vibrators, pyrometers, wheelbarrows, scales, core racks, etc.

RIDGE CASTING CORP.
MINERAL RIDGE, OHIO

FOR SALE

2—#2047-1 Osborn Hydraulic Draw Core or Molding Machine, Power rollover and air operated clamps. Used for Cylinder Head Production—Like new.
2—#147-1 Osborn Core Machine, Hand ram, Power rollover and draw—New.
4—#1000 Fisher Automatic Electric Tilting, Nose Pouring Furnaces A-1 condition.
1—#500 Fisher Automatic Electric Tilting, Nose Pouring Furnace A-1 condition.
3—#94 Osborn Core Blowing Machines—Like new.
1—Robins Floatex Shakeout Model J-11, Table 5'x9'—Like new.
Steel Flask Equipment:
15—35"x42" 18" drag 6" cope
1—54"x54" 20" drag 6" cope
3—39"x58" 12" drag 12" cope
2—57"x57" 6" drag 6" cope
26—18"x54" 5" drag 9" cope Cannon type
These flasks were all used under Sand Slinger and are bared in cope. Bottom boards for same. All sizes of furnace blowers.
Tabor Rollovers 4—22"x32" table, 1—30"x40" table.
Transite Core Plates.
Snap flasks and steel bands.

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.,
TELEPHONE GLENVILLE 1-1538
15019 SARANAC RD., CLEVELAND 10, OHIO

FOR SALE

One Herman rollover moulding machine, late model, in excellent condition, size 40 to 58", 3740 pounds rollover capacity. Equipped with air clamps. Equalizer for rolling on and off. Address: Box 861, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

For Sale

FOR SALE

Pangborn 14 cu. ft. barrel type Rotoblast with loader, reclaimer, motor, spare parts, etc. Now operating. Complete $3950.00. F.O.B. Cars. Address: KEEN FOUNDRY COMPANY, GRIFFITH, INDIANA.

SHOT BLAST EQUIPMENT

1—WHEELABRATOR TABLAST — Model BM 49862-8' 24½" Rotary Tables.
1—WHEELABRATOR TABLAST — Model BM75300—with 6-12" Rotary Tables (like new).
1—PANGBORN TYPE G.K.#2 ROTOBLAST BARREL #14 Ser. 14GK2-4016 with loading device #14. Serial 14FN-41. Abrasive reclaimer #12. Excellent condition. Priced to sell.
1—PANGBORN SAND BLAST ROOM—8½'x10'—Type NB complete with Dust Collector, Fan and Motor.
1—PANGBORN SAND BLAST ROOM—Model AU11-40130 complete with Dust Collector, and motor (new never used).
1—AMERICAN SAND BLAST ROOM—Rotary Table type approximately 8'x8'—no Collector.

MULLERS

2—#2 SIMPSON Good condition—1 Unit Drive, 1 Gear Drive
1—#404 CLEARFIELD with Skip Loader
1—#3 SIMPSON
1—#70 B & P SPEEDMULLER

SANDCUTTER

1—AMERICAN—Model AA-72" x 61" (newly rebuilt)

MOLDING MACHINES

2—ARCADE Squeeze Molding Machines
2—OSBORN Squeeze Molding Machines
1—INTERNATIONAL Power Rollover, Hand Draw 30"x42"
2—INTERNATIONAL Jolt Stripper 24"x24"
1—INTERNATIONAL Core Stripper 15"x15"
1—INTERNATIONAL Jolt Rollover Type HDG (new)
1—JOHNSTON & JENNINGS Jolt Rollover Pattern Draw 31"x47"

CORE BLOWERS

1—CHAMPION CORE BLOWER CB-12
1—INTERNATIONAL Core Blower SB13
1—DEMMLER #1

GRINDERS

1—#30E STANDARD ELECTRIC—10 HP
3—Portable Double End Grinders with 3 HP motor.
1—BLACK & DECKER Double End Pedestal Grinder with 3 HP motor.
1—Double End Heavy Duty Grinder 7½ HP motor.
1—HAMMOND—3 HP-Tool Room Double End Grinder—14" Wheel
1—VAN DORN Double End Bench Grinder.

OVENS

1—"COLEMAN" Tower Core Oven—27 Carriers 84"x25" Combination Oil & Gas Fired.
1—"CARL MAYER" Tower Core Oven—16 Carriers 60"x24" Combination Oil & Gas Fired.
2—Gas Fired Core Ovens 36"x38"x51" (ELI MILLET)

CRANES

1—CLEVELAND 2 Ton 25' span—80' Runway (new)
1—2 Ton Electric Bridge Crane 17'-0" span. 3 HP
1—1 Ton Budget Electric Hoist. 220 volt
1—½ Ton SHEPARD NILES 230 volt DC
1—1 Ton CLEVELAND—Approx. 10' Span

SAND HANDLING EQUIPMENT

ELEVATORS, BELT CONVEYORS, SHAKEOUTS, APRON CONVEYORS, MOLDERS, HOPPERS, SAND STORAGE BINS. DESIGN SERVICE—INCLUDED—FREE CONSULTATION.

MISCELLANEOUS

6—30"x42" Tumbling Barrels
1—NC-2 ROYER Sand Conditioner
1—CUPOLA BLOWER—Roots-Connorsville Positive Pressure with 25 HP motor, 220 volt.
1—INGERSOLL RAND—Model 20 G-25 HP—32 Oz.
1—NORTH AMERICAN BLOWER 10 HP 32 oz.
1—MAGNET 42" E. C. M.
LOT—STEEL FLASKS—Assorted Sizes
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1—HARRY W. DIETERT COMPANY
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2—12 Place Specimen Carrying Racks
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1—Moisture Teller

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2—Milwaukee, Portable, Swing Head Type, 10" squeeze cylinder, 4" jolt cylinder—$175.00 each.
4—Milwaukee, Stationary, Swing Head Type, 10" squeeze cylinder, 4" jolt cylinder—$175.00 each.
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2—Milwaukee, 12" Stationary, Swing Head Type—$200.00 each.
1—Milwaukee, Stationary, 13" squeeze cylinder, 7" jolt cylinder—$210.00.

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814 ADA ST. KALAMAZOO 52, MICH.

FOR SALE
FOUNDRY EQUIPMENT

1—Osborn #1-193 Core Blow Draw Machine with additional Roller Frame, #11878-C.
1—Osborn #92 Core Blowing Machine #11408-E.
1—International Type REDP Air Clamp, Electric Turnover, Air Draw Molding Machine. Size 20" x 36" x 8" complete with motor and controls. Practically new. Purchased January 1949. Used part time only for not over six months.
4—Osborn #403-W Jolt Rollover-Pattern Draw Molding Machines #5457-G, 5642-A, 10503, 10692-A.
4—½ Osborn #403-W Jolt Rollover-Pattern Draw Molding Machines #6525-A, 6614-E, 11463, 11905.
1—Osborn #147 Hand Ram, Hand Rollover, Draw Core Machine #11956-A.
1—Osborn #405-97 Jolt Rollover-Pattern Draw Molding Machine #10845-C.
1—Osborn #602 Jolt Rollover—Pattern Draw Molding Machine #10902-R.
1—Osborn #601 Jolt Rollover—Pattern Draw Molding Machine #10339-E.
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SUPERIOR 1-9300

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Sand Mueller, #414 Clearfield, 4 cu. ft. cap. MD. (1949)
Tumbling mill, Ransohoff, 20 HP AC Motor, complete equipment. #2770. (1944)

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306 EMPIRE BLDG. PITTSBURGH 22, PA.
COURT 1-3413

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Used Price	4000.00
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New Price	$4975.00
Used Price	2200.00
Type BM 75887 Sandblast Size 2C	
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Used Price	300.00
Arcade #91 Molding Machines (5 ea.)	
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Used Price	195.00 ea.
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Si	.015%
Mn	.2–.4%
P	.01–.03%
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Reasonable

WRITE: MR. WILLIAM SCHROTH,
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Classified Advertising

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Sand Tumblast Barrel—Mac Leod 36 x 36
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FOR SALE

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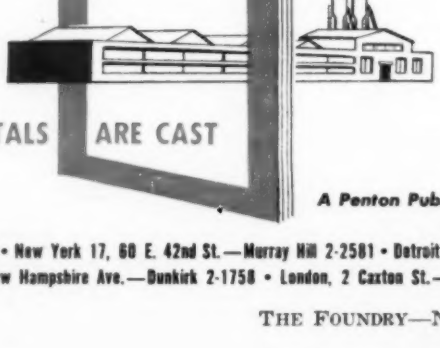

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ADVERTISING INDEX

A

Acheson Colloids Corporation 33
Adams Co., The 36
Air Reduction 166
Ajax Electric Co., Inc. 80, 225
Ajax Electric Furnace Corporation 80, 225
Ajax Electro Metallurgical Corporation 80, 225
Ajax Electrothermic Corporation 80, 225
Ajax Engineering Corporation 80, 225
Ajax Flexible Coupling Co., Inc. 139
Ajax Metal Division of H. Kramer & Co. 224
Allied Chemical & Dye Corporation, Semet-Solvay Division 257
Allis-Chalmers 27, 43
Alloy Metal Abrasive Co. 270
American Air Filter Co., Inc. 55
American Bridge Co. 277
American British Chemical Supplies, Inc. 278
American Gum Products Co. 268
American MonoRail Co., The 64
American Optical Co. 75
American Silica Sand Co., The 35
American Smelting & Refining Co. 276
American Smelting & Refining Co., Federated Metals Division 34
American Wheelabrator & Equipment Corporation 17, 18, 19, 20
Angell Nail & Chaplet Co., The 267
Apex Smelting Co. 23
Archer-Daniels-Midland Co., The Werner G. Smith Co. Division 4, 5
Arrow Tool, Inc. 255
Asbury Graphite Mills, Inc., The 251
Atlantic Chemicals & Metals Co. 263

B

Babcock & Wilcox Co., The, Refractories Division 30, 201
Bakelite Division, Union Carbide & Carbon Corporation 47
Baroid Sales Division, National Lead Co. 190
Bartlett, C. O., & Snow Co., The 127
Bay State Abrasive Products Co. 189
Bay State Crucible Co. 276
Beardsley & Piper Division of Pettibone Mulliken Corporation 194, 195, 196, 197
Berkshire Manufacturing Co., Cannon Vibrator Co. Division 273
Black, Sivalls & Bryson, Inc. 177
Boston Woven Hose & Rubber Co. 72
Buckeye Products Co., The 226
Buffalo Forge Co. 63

C

Campbell-Hausfeld Co., The 246
Cannon Vibrator Co. Division of Berkshire Manufacturing Co. 273
Carborundum Co., The 10, 11, 53, 54, 74
Carl-Mayer Corp., The 119
Carman, Edwin S., Inc. 273
Centrifugal Casting Machine Co. 264
Champion Foundry & Machine Co. 8, 9
Chicago Manufacturing & Distributing Co. 271
Chicago Wheel & Mfg. Co. 184
Chisholm-Moore Hoist Corporation 249
Cities Service Oil Co. 160
Clark Equipment Co., Industrial Truck Division 209
Clayton-Sherman Abrasives Co. 186
Clearfield Machine Co. 143
Cleco Division of the Reed Roller Bit Co. 215
Cleveland Chaplet & Mfg. Co. 277
Cleveland Crane & Engineering Co., The Cleveland Tramrail Division 205
Cleveland Flux Co., The 211
Cleveland Metal Abrasive Co., The 239
Cleveland Tramrail Division, The Cleveland Crane & Engineering Co. 205
Cleveland Vibrator Co., The 259
Climax Molybdenum Co. 254
Combined Supply & Equipment Co., Inc. 275
Construction Machinery Co.'s 268
Corn Products Refining Co. 179
Crescent Brass & Pin Co. 247
Crucible Manufacturers Association 175

D

Davenport Machine & Foundry Co. 183
Dayton Pneumatic Tool Co. 268
DeBardeleben Coal Corporation 278
Delta Oil Products Co. 28
Demmler, Wm., & Bros. 207, 271
Desmond-Stephan Manufacturing Co., The 276
Detroit Electric Furnace Division, Kuhlman Electric Co. 48, 49
Diamond Clamp & Flask Co. 60
Dietert, Harry W., Co. 261
Dixon, Joseph, Crucible Co. 208
Dollinger Corporation 32
Dracco Corporation 250
Dravo Corporation 38, 39

E

Eastern Clay Products, Inc. 199
Eastman Kodak Co. 191
Eclipse Fuel Engineering Co. 274
Eldorado Mining & Refining Ltd. 265
Electric Furnace Co., The 258
Electro Metallurgical Division, Union Carbide & Carbon Corporation 66
Electro Refractories & Alloys Corp. 200

F

Federal Foundry Supply Co., The 2, 44, 45
Federated Metals Division, American Smelting & Refining Co. 34
Ferguson, H. K., Co., The 267
Foundry Equipment Co., The 31
Foundry Supplies Mfg. Co. 46
Foxboro Co., The 16
Freeman Supply Co., The 137
Fremont Flask Co., The 152
Frontier Bronze Corporation 12

G

General Electric Co. 69, 264
Globe Steel Abrasive Co., The 26
Gordon, Claude S., Co. 256
Great Western Manufacturing Co. 216
Greene Electric Furnace Co. 267

H

Harbison-Walker Refractories Co. 181
Harnischfeger Corporation 42
Harrison Machine Co. 266
Hauck Manufacturing Co. 272
Hercules Powder Co. 219
Herman Pneumatic Machine Co. 13
Hewitt-Robins, Inc. 52
Hickman, Williams & Co. 221
Hines Flask Co., The 14, 15
Holcroft & Co. 243
Hough, Frank G., Co., The 71
Houghton, E. F. & Co. 266
Houghton, C. T. 210

I

Illinois Clay Products Co. 233
Illinois Testing Laboratories, Inc. 259
Imperial Belting Co. 252
Independent Pneumatic Tool Co. 240
Industrial Equipment Co. 257
Industrial Fabricating, Inc. 128
Industrial Truck Division, Clark Equipment Co. 209
International Graphite & Electrode Corp. 68
International Molding Machine Co. 148, 149
International Nickel Co., Inc., The 1, 21
Ironton Fire Brick Co., The 147

J

Jackson Iron & Steel Co., The 270
Jeffrey Manufacturing Co., The 62
Johns-Manville 232
Joy Manufacturing Co. 82, 83

Continued on page 300

ADVERTISING INDEX

K

Keokuk Electro-Metals Co. 213
Knight, Lester B., & Associates, Inc. 185
Kramer, H., & Co., Ajax Metal Division 224
Krause, Chas. A., Milling Co. 123
Kuhlman Electric Co., Detroit Electric Furnace Division 48, 49
Kwik-Mix Co. 227

L

Lanly Co., The 244
Lindberg Engineering Co., Lindberg-Fisher Division 37
Lindberg-Fisher, A Division of Lindberg Engineering Co. 37
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corporation 57
Link-Belt Co. ..... 25, Back Cover
Logan Co. 155

M

Marshall, L. H., Co. 228
Martin Engineering Co. 22
Master Pneumatic Tool Co., Inc., The ... 266
Mathieson Chemical Corporation ..... Inside Front Cover
Maughlin, H. P., Co., The 270
Metal Blast, Inc. 125
Metalloy Corporation 251
Miller Motor Co. 171
Miller-Taylor Tool Co. 272
Milwaukee Chaplet & Mfg. Co. 220
Milwaukee Foundry Equipment Division, SPO Inc. 163
Modern Equipment Co. ..... 302, Front Cover
Moline Iron Works 277
Molybdenum Corporation of America ... 70
Monsanto Chemical Co. 85
Moulders' Friend, The 76
Multiplex Machinery Corp. 274
Murphy, Jas. A., & Co. 265, 276
Murray-American Mill 279

N

National Engineering Co. 131
National Lead Co., Baroid Sales Division 190
National Lead Co., Titanium Alloy Mfg. Division 24
Newaygo Engineering Co. 223
New Haven Vibrator Co. 255
New York Belting & Packing Co. 79
Nichols Engineering & Research Corporation 273
Norton Co. 50, 58, 59

O

Ohio Electric Mfg. Co., The 273
Oliver Machinery Co. 265
Osborn Manufacturing Co., The 134, 135
Ottawa Silica Co. 151

P

Pangborn Corporation 6, 7, 61, 198
Penn Iron Works 264
Petersen Oven Co., The, Stroman Furnace & Engineering Co. Division 67
Pettibone Mulliken Corporation, Beardsley & Piper Division 194, 195, 196, 197
Pickands Mather & Co. 77
Pioneer Manufacturing Co., The 272
Pittsburgh Crushed Steel Co. 174
Pittsburgh Metals Purifying Co. 159
Pressed Steel Division, Truscon Steel Co. . 51
Prime-Mover Co., The 217
Producers Core Sand Corporation 276
Puro-Seal Co., The 279
Putnam, A. H., Co. 279

R

Radium Chemical Co., Inc. 275
Reda Pump Co. 84
Redford Iron & Equipment Co. 203
Reed Roller Bit Co., Cleco Division 215
Remmey, Richard C., Son Co. 256
Republic Steel Corporation 65
Robeson Process Co. 268
Roots-Connersville Blower Corporation .. 236
Rotor Tool Co., The 56
Royer Foundry & Machine Co. 117
Royersford Foundry & Machine Co. 278

S

Schneible, Claude B., Co. 193
Schramm, Inc. 248
Scientific Cast Products Corporation, The . 261
Semet-Solvay Division, Allied Chemical & Dye Corporation 257
Shepard Niles Crane & Hoist Corporation 245
Simonds Abrasive Co. 40
Simplicity Engineering Co. 29
Sly, W. W., Manufacturing Co., The 140
Smillie, C. M., & Co. 274
Smith Oil & Refining Co. 132
Smith, Werner G., Inc. 168, 169
Smooth-On Mfg. Co. 279
Spencer Turbine Co., The 73
SPO Inc., Milwaukee Foundry Equipment Division 163
Standard Pattern Works, Machine Division 253
Standard Silica Corporation 278
Stearns Magnetic Manufacturing Co. 229
Steel Shot & Grit Co. 174
Sterling Wheelbarrow Co. 86, 252
Stevens, Frederic B., Inc. ... Inside Back Cover
Stroman Furnace & Engineering Co. Division of The Peterson Oven Co. 67
Sutter Products Co. 262
Syntron Co. 263

T

Tabor Manufacturing Co., The 41, 301
Tamms Industries, Inc. 258
Tennessee Products & Chemical Corporation 145
Tincher Products 241
Titanium Alloy Mfg. Division, National Lead Co. 24
Toledo Matchplate Co. 218
Truscon Steel Co., Pressed Steel Division 51

U

Union Carbide & Carbon Corporation, Bakelite Division 47
Union Carbide & Carbon Corporation, Electro Metallurgical Division 66
Union Carbide & Carbon Corporation, The Linde Air Products Co., Unit 57
United Compound Co. 250
United States Electrical Tool Co., The 81
United States Graphite Co., The 231
United States Gypsum 78
United States Rubber Co. 260
United States Steel Corp., Subsidiaries .. 277
United States Steel Export Co. 277
Universal Engineering Co. 157
U. S. Industrial Gloves 260

V

Vanadium Corporation of America 173
Vonnegut Moulder Corporation 271

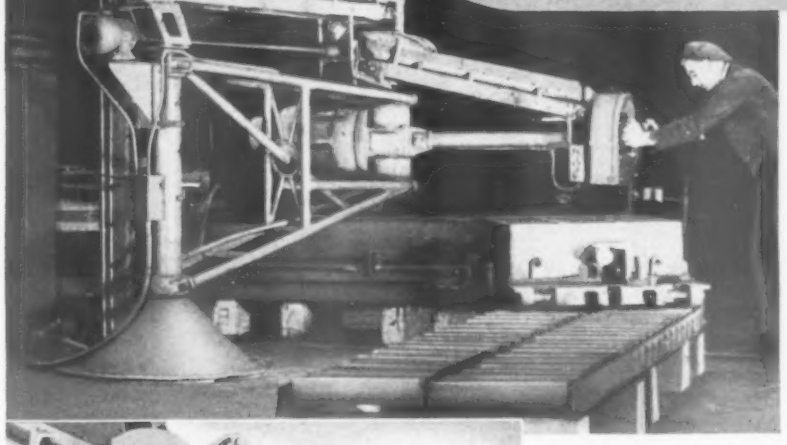
W

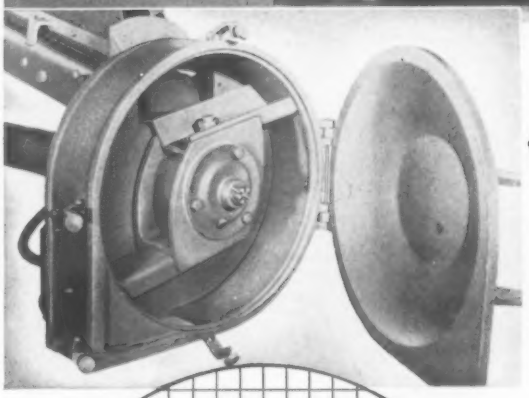
Wadsworth Equipment Co. 276
Wellman Bronze & Aluminum Co., The ... 254
Wellman Engineering Co., The 278
Westover Engineers 278
Wheland Co., The 275
Whiting Corporation 165
Wickland, A. A., & Co. 279
Will, Arthur E. 253
Willson Products, Inc. 242
Woodward Iron Co. 121

Table of Contents, page 3

Classified advertisers, 293, 294, 295, 296, 297

TABOR'S SANDRAMMER works all day—every day AT LOW COST





Adjustable, multi-blade impellors give greater ramming speed and five-fold life. Simple blade adjustment compensates for wear and controls density of mold. Rams mold with equal density throughout whole area and depth.

Assume the Sandrammer pictured is in *your* foundry. Why did you "buy" it and what's it "doing" for you?

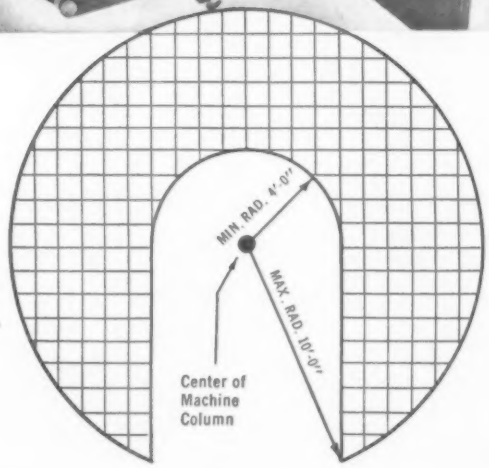
(1) Its *first cost was low*—justified its use where such equipment formerly seemed "out of the question".

(2) You respect it as a first-class production machine. You've got it on heavy foundry floor work. But you can switch it over to making large cores—or to long-run production of cores. You keep it busy around the shift—around the clock.

(3) It's flexible. You arranged it with a roller conveyor, but it's just as adept with a pit or turntable set-up.

(4) It's *paying off*—ramming more molds, better molds, a greater range of mold sizes and depths. Your operator likes its balance, "feel", push-button control. And, it's strong, dust-protected, built to last.

Shouldn't this Sandrammer *be* in your foundry?



The blocked portion of this diagram shows working floor area covered by ramming head of Sandrammer. Since each block represents one square foot, this sketch quickly tells you the combined maximum lengths and widths of molds which the Sandrammer can handle.

SANDRAMMER SPECIFICATIONS

Height from floor to top of feed chute	7'-0"
Height from floor to sand discharge point	3'-0"
Max. height of flask	2'-9"

(Sandrammer—being stationary—can be mounted on a raised concrete base, thus increasing maximum height of flask at no sacrifice to ramming efficiency.)

Sand throwing capacity ..... Up to 500 lbs. per minute

Write, wire or 'phone.
A Tabor engineer will be ready to team up with you.

The TABOR Manufacturing Co.

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6225 TACONY STREET • PHILADELPHIA 35, PENNA.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION, INC. MEMBER FEMA

Tabor Manufacturing Co. is licensed to manufacture and sell Sandrammers by Foundry Equipment, Ltd., Leighton Buzzard, Bedfordshire, England.

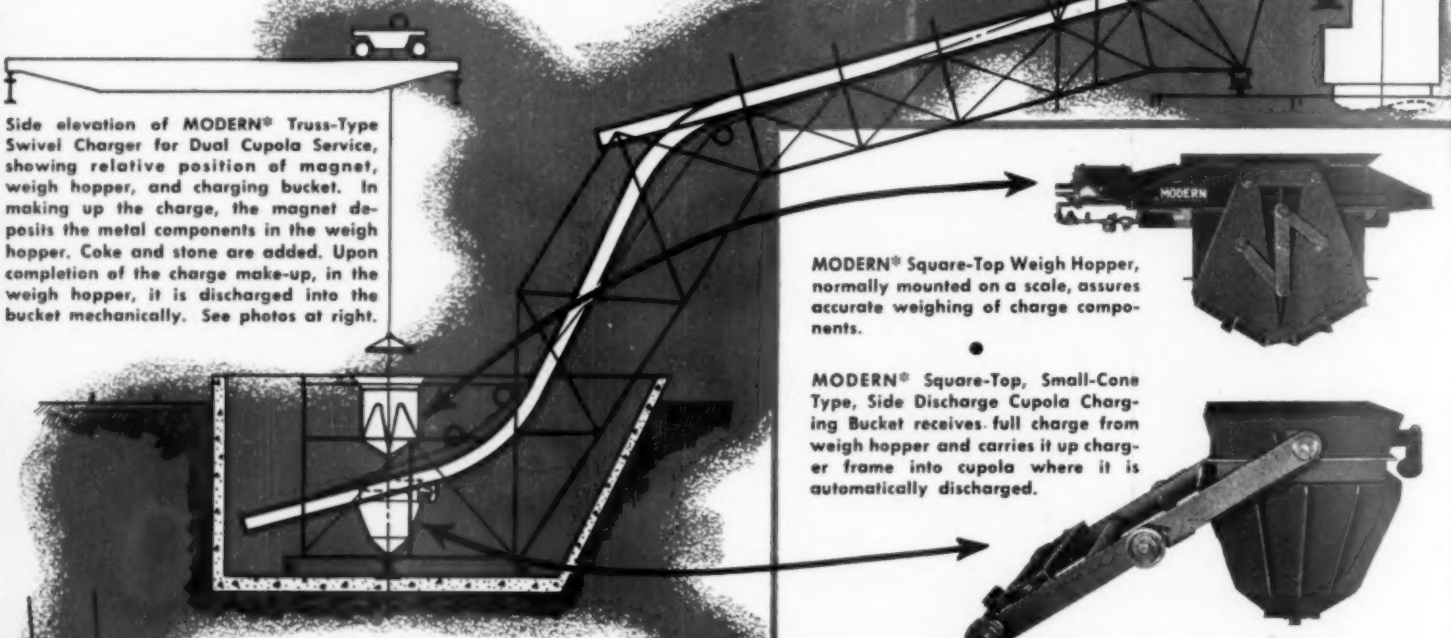
Engineered by MODERN* for Fast, Efficient Cupola Charging!

The photograph on the front cover of this magazine is a general view of the MODERN* Truss-Type, Swivel Cupola Charger, Custom Built and Individually Engineered for the Production Foundries Division, Jackson Industries, Inc., Birmingham, Ala. On this page are photos of some of the units of this assembly, and simplified drawings of the charger construction.

The MODERN* Representative in your area can arrange for Experienced Engineering Counsel to help you MODERN-IZE your Cupola Charging Operations. Write for Catalog 147-A and Bulletin CC8-49.

MODERN* Square-Top, Cone Type, Side Discharge Bucket inside of cupola at moment of charge release. Its small center-cone and side discharge doors produce an even charge in the stack, with loose center and compact sides. Users report higher melting rates and "better metal".

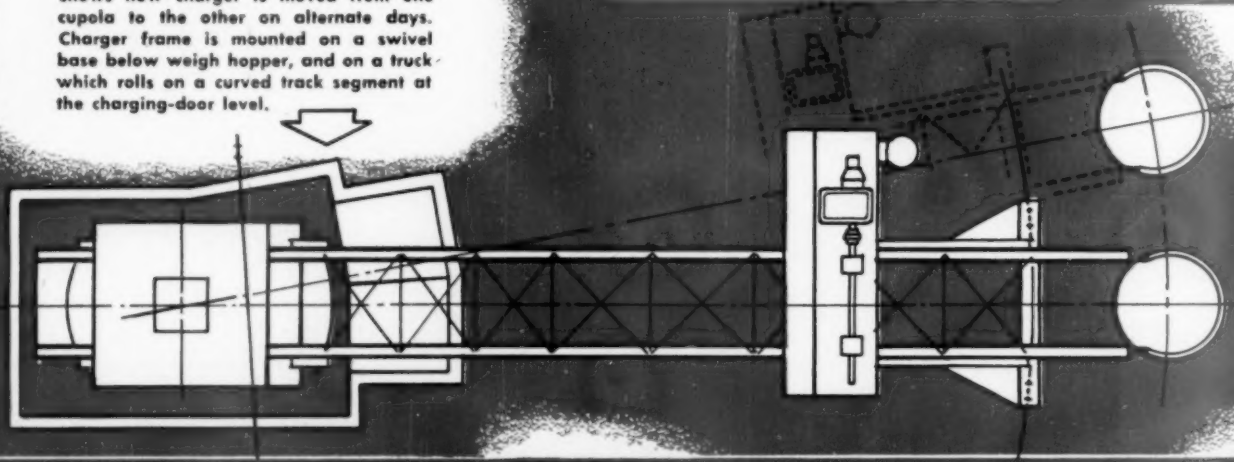
Side elevation of MODERN* Truss-Type Swivel Charger for Dual Cupola Service, showing relative position of magnet, weigh hopper, and charging bucket. In making up the charge, the magnet deposits the metal components in the weigh hopper. Coke and stone are added. Upon completion of the charge make-up, in the weigh hopper, it is discharged into the bucket mechanically. See photos at right.



MODERN* Square-Top Weigh Hopper, normally mounted on a scale, assures accurate weighing of charge components.

MODERN* Square-Top, Small-Cone Type, Side Discharge Cupola Charging Bucket receives full charge from weigh hopper and carries it up charger frame into cupola where it is automatically discharged.

Plan View of Truss-Type Swivel Charger shows how charger is moved from one cupola to the other on alternate days. Charger frame is mounted on a swivel base below weigh hopper, and on a truck which rolls on a curved track segment at the charging-door level.



MODERN EQUIPMENT CO.

PORT WASHINGTON, WISCONSIN

CUPOLAS • CUPOLA CHARGERS • LADLES OF ALL TYPES • POURING DEVICES • METAL POURING SYSTEMS • CRANE AND MONORAIL SYSTEMS • ELECTRIC CRANES

25 Years A SATISFIED Stevens CUSTOMER

THE ROOTS-CONNERSVILLE BLOWER CORPORATION

The Roots-Connersville Blower Corporation, Connersville, Indiana, is recognized as one of the leading manufacturers of blowers and pumps for all phases of industry. Their foundry operations cover castings of all materials—in every shape and size. They have used Stevens facings with satisfaction for over 25 years.

This is a typical example of how Stevens controlled quality products make satisfied customers, and keep them that way—for years and years. Stevens customers know they can depend on the finest quality products at all times. They know they can rely on the Stevens technical staff and laboratory services to provide them with the newest, most efficient facings and equipment for meeting every foundry problem. They know that Stevens stands ready to help them at all times.

If you are not now a Stevens customer, you owe it to yourself to call in the Stevens representative in your territory and get acquainted. You'll find he can give you a lot of suggestions to increase production and profit in your foundry operations.

This bedplate mold, requiring 26,000 lbs. of gray iron to cast, is being sprayed with Stevens Carbon Blacking at the foundry of Roots-Connersville Blower Corporation.

EVERYTHING FOR A FOUNDRY

FREDERIC B. STEVENS INCORPORATED

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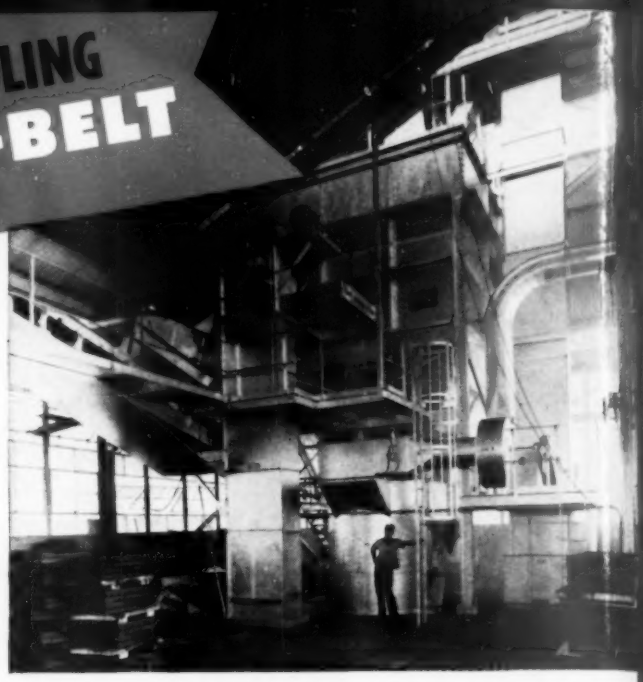
SAND PREPARATION and HANDLING MECHANIZED by LINK-BELT



General view of centralized sand preparation plant consisting of bucket elevator for returning used sand to the unit, revolving screen, mullers with cooling attachments, storage bin and bucket elevator for bringing sand up to Revivifier where it is aerated and given "flowability" and then discharged to the distributing belt conveyor. The plant has a rated capacity of 60 tons of sand an hour.

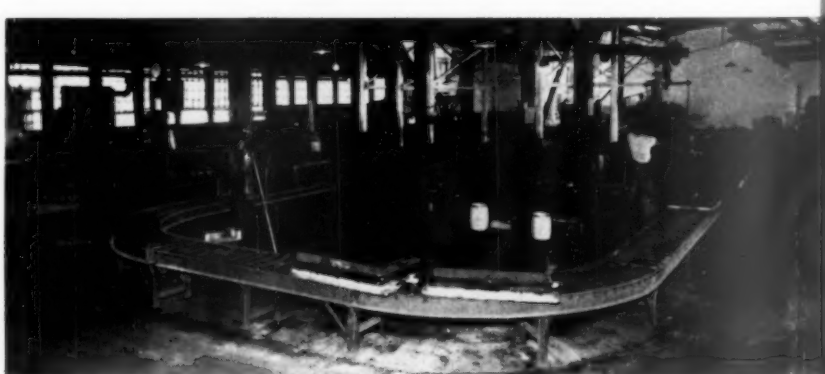
Section of squeezer line showing distributing belt conveyor that supplies the molders' hoppers, also the gravity-roll conveyors. An oscillating conveyor handles the shakeout sand from the gravity roll lines back to the sand plant.

This is another example of Link-Belt foundry engineering put to work.

No two foundry mechanization problems are exactly alike. That's why it pays to look to the broad experience of Link-Belt engineers in analyzing your conditions and in the recommendation of the equipment integrated into a system best suited to your requirements. These Link-Belt foundry mechanized systems pay off in the best adaptations of existing facilities, efficient use of the workers' time and effort, and the maximum employment of flask equipment with an even production flow of more and better castings.

Any size and type of foundry — grey iron, malleable, steel, and nonferrous — can be made a more profitable operation with well planned sand preparation units and sand, mold, and castings handling equipment. Ask Link-Belt foundry engineers to look over your present methods. Get in touch with our nearest office.

The sand-distributing belt conveyor also supplies these large hoppers equipped with air-operated gates. Molds for the larger castings are prepared here.



The previously installed Link-Belt cope and drag unit is now serviced by the distributing belt conveyor from the sand preparation plant in the new foundry addition.

LINK-BELT COMPANY

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Handling and Sand Preparation MACHINERY

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